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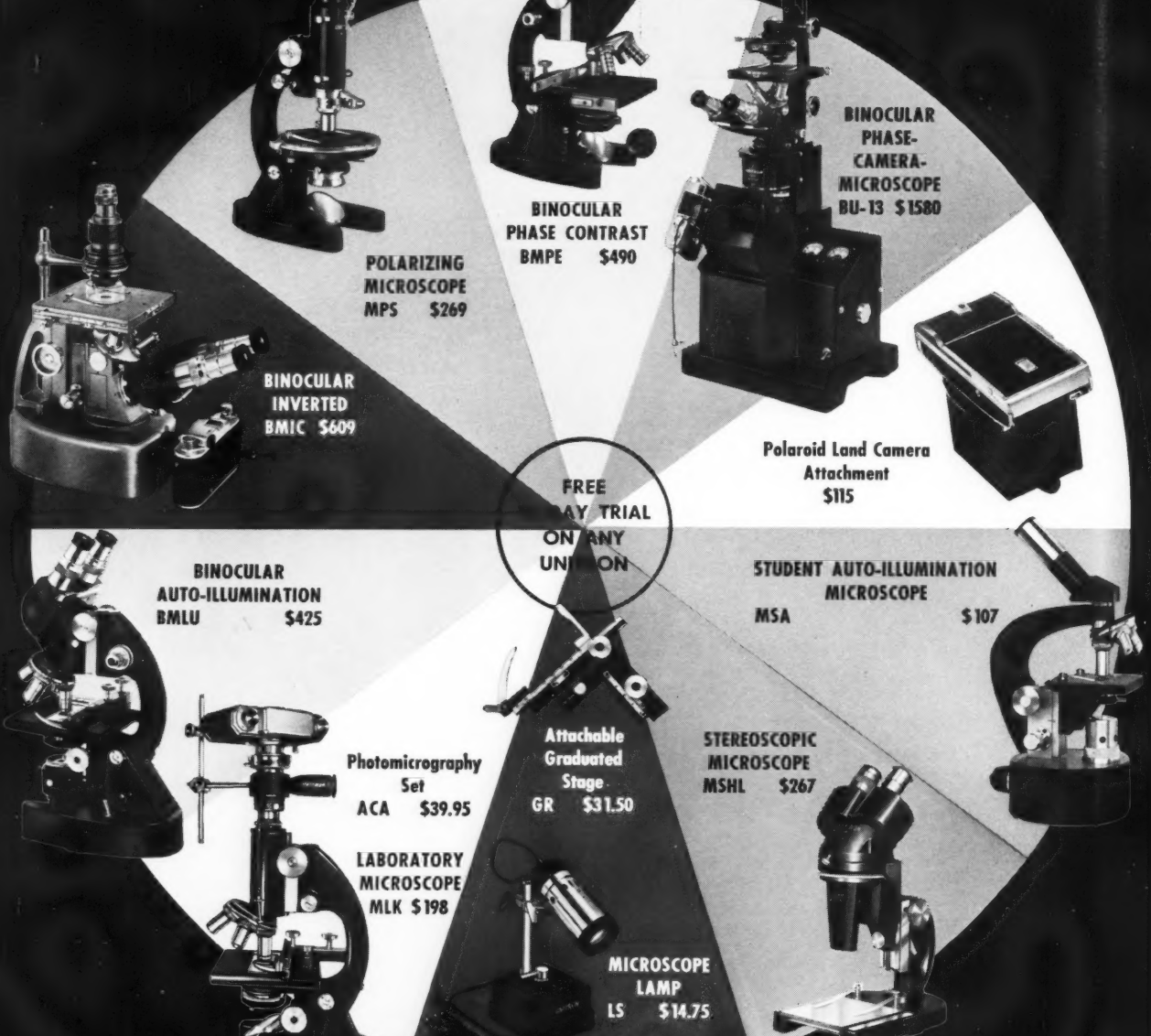
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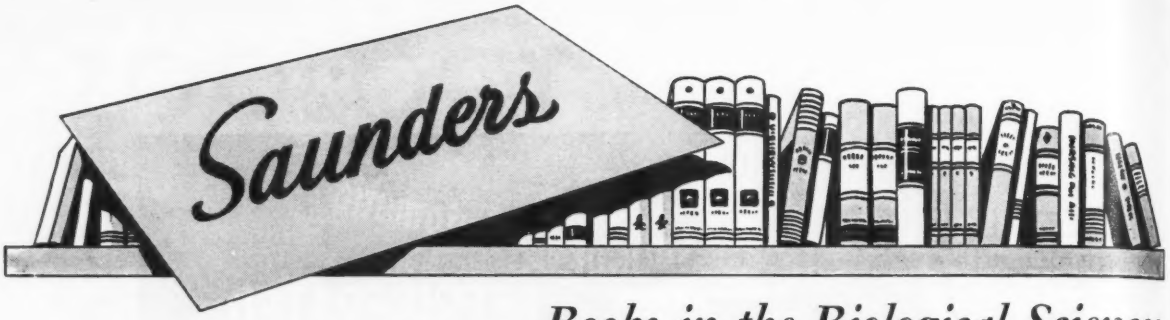

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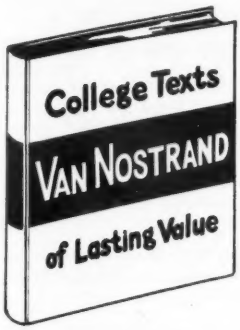

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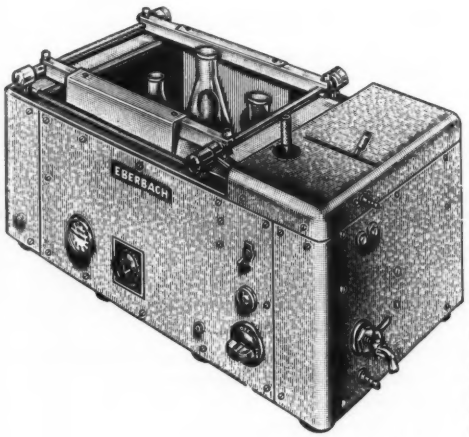

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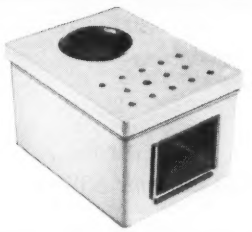

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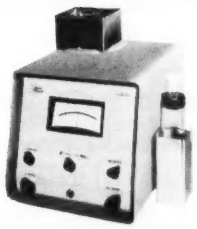

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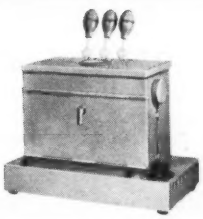

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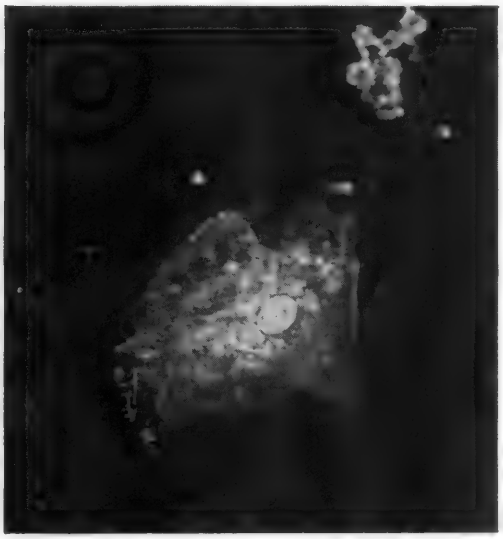

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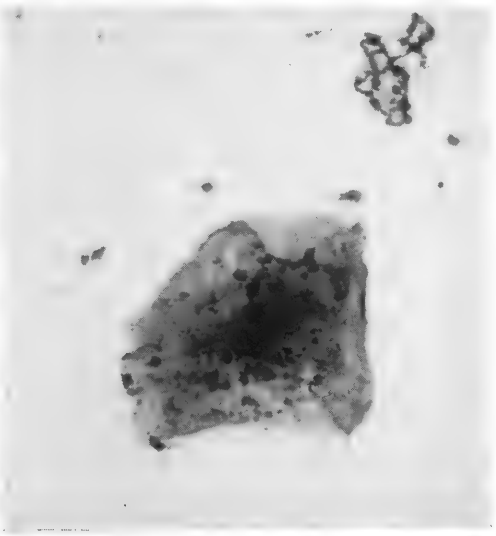

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An AIBS Education Program Emerges

THIS is the first special issue in the history of the AIBS BULLETIN. The decision to break with precedent and publish an issue devoted to a single topic was not made lightly. Under the able and devoted editorship of Mrs. Ileen Stewart, the BULLETIN consistently has presented a varied fare of articles of breadth and excellence. There is no thought of departing permanently from that policy. However, the initiation by the AIBS of two extensive projects in biological education is a milestone in the development of the Institute on the one hand and a significant event in the field of science education on the other.

The three major articles in this issue of the BULLETIN trace the expanding educational program of the AIBS in both chronological and developmental sequence. Dr. Oswald Tippo writes of the short four-year history of the Institute's Committee on Education and Professional Recruitment. From this committee, under his chairmanship, have come our Visiting Biologists Programs, the Secondary School Biological Sciences Film Series and the Biological Sciences Curriculum Study. Dr. H. Burr Roney speaks of progress being made in the Film Series and Dr. Arnold B. Grobman outlines plans now being followed in the Curriculum Study.

Biology is fortunate in having these projects under sponsorship of one organization. Each project has its own policy advisory group and in large measure is autonomous, but there has developed strong, close liaison between the policy advisory groups and the staffs of the two projects. The goal is the same for each—the improvement in content of biology courses. The means of attaining that goal differ.

Our Curriculum Study and our Film Series are not innovations. The physicists and the mathematicians already have embarked upon curriculum studies. The physicists have a film course now in use in secondary schools and the chemists completed their film course within the past few weeks. The comparable biology projects are unique, however, in a number of ways, as Dr. Roney and Dr. Grobman explain in their articles. One major difference, in my opinion, is the significantly greater degree of participation by research biologists and secondary school biology teachers in the planning of these enterprises. The Film Series is drawing upon the talents of about 120 people and the Curriculum Study will involve at least this many and probably more. In this wide participation lies the strength of these projects not only in their planning but in their eventual acceptance. Actually, all biologists can have a hand in them. Both Dr. Roney and Dr. Grobman invite your suggestions and comments, and I urge you to accept their invitations.

HIDEN T. COX,
Executive Director, A.I.B.S.

Biology and the Educational Ferment*

OSWALD TIPPO, *Chairman, AIBS Committee on Education, and Chairman, Department of Botany, Yale University*

AS WE look back over the educational history of this country, clearly one of the most regrettable developments of the past few decades is the way in which college and university scientists have turned their backs on high school science and the high school science teacher. Preoccupied with research, we have neglected the secondary science teacher—his preparation, his welfare, and the courses he teaches. Into the vacuum thus created have moved the teachers colleges and the departments of education, until at the present time these agencies have almost complete control of the education of high school science teachers and of the courses they teach. Certainly few college scientists have much to do with the preparation of the school science instructor and they have little knowledge of the courses he teaches. Indeed, they know few high school teachers, for the latter, after suffering years of neglect on the part of their university counterparts, have affiliated themselves with professional educational organizations rather than with the science societies which are of greatest interest to the college professor.

Belatedly, the scientists of the colleges and universities have awakened, and they are not pleased with the results produced by their neglect. At first there were loud outcries and a search for scapegoats. Someone had to be blamed for the situation. After this period of hysteria had run its course, it became evident to the calmer members of the university community that something had to be done and that remedial steps could best be taken in partnership with those concerned rather than in open conflict and its accompanying irresponsible name-calling and blame-fixing. Thus, at present, it seems clear that if we are to improve secondary school science courses, this improvement will come through the cooperative efforts of the high school teacher, the professional educator, and the university scientist. Each group has something to contribute to the solution of the problem.

It is not my purpose tonight to list all the agencies which are concerned with this and related educational problems, although in passing and since we are meeting under the auspices of the American Association for the Advancement of Science, I might call your attention to the fact that the AAAS and the American Association of Colleges for Teacher Education have formed a Joint Commission on the Education of Teachers of Science and Mathematics. However, I do want to describe the activities of a group which has been working quietly and without fanfare during the last three years. I refer to the Committee on Education and Professional Recruitment of the American Institute of Biological Sciences. From the outset the attempt was made to achieve representation on this committee from colleges, both public and private, from graduate schools, from secondary schools, both public and independent, as well as broad representation from the numerous biological disciplines. At present, the roster of the committee is as follows:

Ronald Bamford, Dean, Graduate School, University of Maryland; *Gairdner Moment*, Professor of Biology, Goucher College; *Harriet Creighton*, Professor of Botany, Wellesley College; *Harvey Fisher*, Chairman, Zoology Department, Southern Illinois University; *Ladd Prosser*, Professor of Physiology, University of Illinois; *L. S. McClung*, Professor of Bacteriology, Indiana University; *Howard Phillips*, formerly Dean of Graduate School, Emory University, now President, Alabama College; *John Bodel*, biology teacher, Hotchkiss School, Lakeville, Connecticut; *Paul Klinge*, formerly high school teacher in Indianapolis, now at Indiana University, Co-ordinator of Secondary School Science; *Philip Fordyce*, high school teacher, Indianapolis; *Oswald Tippo*, Chairman, Botany Department, Yale University.

During its three years of existence, the AIBS Education Committee has been concerned with various activities and projects but at the moment I wish to speak of three before turning to a consideration of its activities in the high school field. Three years ago it initiated a Visiting Lecturers program, or speakers bureau, with National Science Foundation and Atomic Energy Commission support. In this program outstanding biologists—both investigators and teachers—visit college campuses, especially the campuses of smaller colleges, for a few days during which time they lecture to classes and other groups, present laboratory demonstrations, and confer with faculty and students. It is now proposed that this program be extended to the secondary schools.

Early in our deliberations we gave consideration to the use of films since this is one way to extend the availability of those who have great talent for teaching, and, in addition, advantage can be taken of some of the unique contributions which the camera can make to classroom teaching. We are, therefore, producing, with the aid of an NSF grant, two experimental films which are designed for use in beginning college courses in biology, botany, and zoology, although we feel these films will be useful in secondary schools as well. These two films will be in color and sound. The committee purposely chose to make one of these films in an area requiring detailed microscopic preparations, and the other in a theoretical area of biology. The first of these films is on meiosis, which is often poorly taught even though it is most fundamental for the proper understanding of genetics. The other film is on evolution and should be a real test of the potentialities of the camera. The two films will be produced under the supervision of Professor Burr Roney of the University of Houston, who has had considerable experience and success in the preparation of films as well as in producing television programs in biology. For each film we have appointed an advisory panel or group of consultants made up of experts in the field, augmented by experienced classroom teachers. In this way we hope to insure the achievement of scientific accuracy as well as the utilization of the best pedagogical methods. If these two experimental films are well received, we may embark on a more ambitious program of movie production for college biology courses.

While these two experimental films are being produced, the AIBS Education Committee has decided to embark on an extensive and thoroughgoing study of biological education at *all* school and college levels. It has, therefore, set up a special Curriculum Study Group in the Biological Sciences which will consider biological instruction in the elementary schools, junior high schools, senior high schools, colleges, and graduate schools. We need to know at which grade and age level biology should be introduced, and how it should be taught in these early grades. We need a critical re-examination of the high school biology course—its nature, its content, and its level. The group may wish to make recommendations with respect to textbooks, laboratory manuals, films, and laboratory equipment and facilities. It may decide to establish a set of standards for these various items. At the college level, the group will want to give attention to the all-important beginning courses, be they biology, botany, or zoology courses. It is often charged that we lose many a potential biology major in the beginning college course which is criticized as being over-loaded with descriptive details to the detriment of the development of the conceptual framework of the biological sciences. The group, therefore, will need to consider the fundamental biological principles which should form the basic structure of all such courses, and how to bring these courses up-to-date. At a more advanced level, the study group will examine the other undergraduate biology courses, and perhaps develop some recommendations as to what constitutes desirable curricula for undergraduate majors in botany, zoology, and

* Condensed from the address of the retiring Vice President, Section G, AAAS, delivered December 29, 1958.

biology. Passing on to the graduate school, it is hoped that the group will examine such problems as the proper preparation of college biology teachers and the desirability of special biology courses for prospective high school and elementary school teachers.

In making appointments to this study group, the parent Education Committee has again tried to achieve wide representation from the several areas of the biological sciences as well as from various educational levels. We have been fortunate in being able to persuade Dr. Bentley Glass to assume the chairmanship of this important group. The full membership of the Biological Sciences Curriculum Study Group is listed in Dr. Grobman's article in this issue of the *Bulletin*.

The problems set before this group are complex and manifold and consequently this will have to be a long-range study requiring considerable time, even though the problems at the various educational levels may be parcelled out to special subcommittees. In the meanwhile, the AIBS Educational Committee is convinced that something should be done *immediately* about the high school biology course. It, therefore, proposes to prepare a film series for the secondary school biology course, and it has received a large grant for this purpose from the Fund for the Advancement of Education. A Steering Committee has been appointed consisting of the following members:

Oswald Tippo, Professor of Botany, Yale University, Chairman; *Daniel Mazia*, Professor of Zoology, University of California; *John Moore*, Professor of Zoology, Columbia University; *Harriet Creighton*, Professor of Botany, Wellesley College; *L. S. McClung*, Professor of Bacteriology, Indiana University; *Philip Johnson*, Director, Science Education, Cornell University; *John Bodel*, Hotchkiss School; *Marston Bates*, Professor of Zoology, University of Michigan; *Herbert Albrecht*, Professor of Agronomy, Pennsylvania State University; *Ralph Gerard*, Medical School, University of Michigan; *Dorothy Matala*, Professor of Biology, Iowa State Teachers College; *Albert Navez*, plant physiologist, Newton High School, Newton, Mass.; *Richmond Mayo-Smith*, Exeter Academy; *Frank Lindsay*, Chief, Bureau of Secondary Education, State Department of Education, California; *Jean Cooper*, high school teacher, Cheyenne, Wyoming; *Ralph Emerson*, Professor of Botany, University of California.

The plan is to prepare a film series which will cover the entire year course in biology. There will be 120 one-half hour, 16 mm. films in color and with sound. In addition, it is proposed that there be 30-40 films which may be used to supplement the 120 basic films. The series will be aimed at the 10th grade level. It will not be an easy course; rather we hope that it will cause the students to extend themselves. It will not presuppose a knowledge of physics and chemistry, but the necessary background in these two fields will be taught along with the biology. A teachers' manual is planned for the guidance of the instructor. A students' manual will be prepared to guide the student in laboratory work and in field studies. It will include problems for solution, and, in general, will serve as a study guide, and in that connection it will contain supplementary reading lists. Professor Burr Roney of the University of Houston will be in charge of the course. Some of the material will be presented by outstanding investigators and other distinguished teachers.

There is one aspect which the AIBS Educational Committee and the Film Series Steering Committee wish to stress, and that is that this film series will be made *flexible*, so that the films, or at least blocks of films may be presented in different sequences. We do not claim that there is one ideal sequence. We propose to prepare a course with 120 films, plus 30-40 supplementary films. Some teachers and some schools may wish to use all the films; some may elect to use one or two units; others may care to use only one or two individual films. There may be other teachers who will not want to show any of the films in class but may wish to view the films in private as a sort of special preparation for their courses. In any case, it is thought that the production of the film series will help to bring high school biology courses up-to-date. However, I should like to emphasize again that there will be no attempt to dictate to anyone for we are convinced that there is no one ideal way to give the course—there is no perfect sequence. We merely wish to present one way of giving the course, and we hope that the major divisions of the series, at least, will have enough unity so that whole blocks of the films may be interchanged.

The AIBS Educational Committee and the Film Series Steering Committee have agreed on a number of general principles, or desirable goals:

1. We are determined that this series will present an up-to-date course in the biological sciences. It will be the special responsibility of our research consultants to insure this goal.
2. We are equally determined to incorporate the best teaching methods in the course. We shall rely on our classroom teachers and our professional educators for this.
3. We are agreed that the series should stress principles, concepts, larger issues, and problems, rather than descriptive details and rote learning.
4. The series will deal with the fundamentals of biology, with applications introduced where significant and relevant. It will not be a course in applied biology.
5. The course will not be restricted to the single human species, but will consider other animals, plants, microbes, viruses, etc.
6. As stated before, we propose to make this a flexible series—one in which the parts may be *interchanged*. We are not urging uniformity but we are striving for excellence.
7. In the preparation of the course, we shall need the widest possible participation by teachers and scientists at all levels. We welcome suggestions, comments, and ideas.
8. It is not our intention to cram this particular course or series down anyone's throat. It is our goal to prepare a course of the highest possible excellence. It will then be up to the teachers and the schools of the country to decide whether they want to use it in its entirety, or in sections (which may be put together in different sequences), or to use merely individual films. By some, the series or its parts may not be used in the classroom at all, but instead will be viewed privately by teachers who lack adequate biological training, or who merely wish to brush up on a topic here and there. Some schools may wish to use the series to determine whether their own courses are up-to-date.
9. Finally, we hope that the series will employ the full potential of the camera. Certainly there are some aspects of biology which can only be presented in film—short of touring the world, that is. In the units on evolution and ecology we plan to make effective and imaginative use of films on grasslands, mountain floras and faunas, marine habitats, and the tropics. We intend to show great biologists at work through visits to their research laboratories where students will hear and see them carrying on research. We hope to weave in at appropriate places shots of some of the great biological laboratories and facilities—marine stations, government laboratories such as the atomic energy laboratories, botanic gardens, phytotrons, etc.

In conclusion, let me say that the members of the several committees I have mentioned are most anxious to have suggestions and criticisms from all elements in the biological community, for we are sure that we cannot succeed unless we have the active participation and assistance of our colleagues. Accordingly, it is hoped that if you are approached to serve on one of these committees or consultative panels, or to teach in this series, or to prepare materials for the films, that you will be ready to do your bit in a series of enterprises which are modest attempts to make up for the neglect of school science and school teachers which we university biology professors have been guilty of for much too long a period.

A New Approach to the High School Biology Course

H. BURR RONEY, *University of Houston, Houston, Texas; Director, AIBS Secondary School Biological Sciences Film Series*

A speech delivered at a meeting of the National Science Teachers Association, Atlantic City, April 2, 1959.

A NEW educational tool has appeared on the academic horizon. It is the direct-teaching film for classroom and television use. Within the short period of less than five years, this instrument has been explored in mathematics and the sciences by the White Physics courses, the Baxter Chemistry course, and several courses in mathematics, including those by the School Mathematics Study Committee, with headquarters at Yale University, courses by Washington University and the University of Houston.

To a few, the "filmed course" is apparently best described as an illegitimate graft-hybrid of poor teaching and bad television, conceived in sin (that is to say, "by administrations, out of necessity"), developed in the dark, and abandoned on the academic doorstep where it ought to be left to die. However, to most of us, such a powerful means of bringing teachers and their subject matter to students as instructional film, represents an unparalleled opportunity for increasing the effectiveness of teaching, broadening the minds and the backgrounds of learners, and, ultimately, advancing our profession. The development of such film courses has now, we hope, reached its biological maturity with the series for secondary schools being produced under the auspices of the American Institute of Biological Sciences.

I would like to describe to you, briefly, something about this biology course, including its objectives, its form and its content, as well as the people involved in producing it. At this point, it is also appropriate that we give full recognition to the Fund for the Advancement of Education for its financial support and encouragement of the project. The FAE has generously provided the money necessary to prepare and organize the content and to put it in front of the camera. From that point on, the investment required will come from the producer-distributor, about which I will say more later.

First, let me state as precisely as I can the primary objectives as I understand them. It is our intention to produce on film the lecture-demonstration part of a secondary school biology course aimed primarily at the tenth grade level, along with an appropriate teachers' manual and students' guide. This material will be designed for maximum use, in that it will be available in any size lots from one film to the entire course, and will be as flexible as possible in arrangement of its parts. Maximum use will be made of the film medium (including visual aids, "field" inserts, cinemicrography and animation), within the limits of our scheduled production time and available funds, and consistent with our primary objective of instruction rather than entertainment only. It is not the intention of the various committees and consultants involved to create a course so new or different in its approach as to be almost unusable by the average teacher. It is, however, their intention to create a strong course which places more emphasis on contemporary biology than has been common in the past at the secondary school level. It is recognized that such a course cannot please everyone, because there are many good teachers and many ways of teaching that are all equally successful, but it is hoped that the composite advice of many biologists and teachers will result in at least one kind of "good course." One of the advantages of AIBS sponsorship is the fact that instead of creating an individual course that might attempt to become definitive (and thereby do biology great harm), the AIBS can look forward over the years to continual improvement, revision, elimination of parts or even of the whole course. Knowing the always imperfect nature of human activity, this essential expendability is a great comfort to me.

Matters of intention become real as they are implemented in the form, organization and content, so let me move on to these topics and report on the solid way in which the project is developing.

The course will consist of 120 basic lecture-demonstration films of 30-minute duration. These will be direct teaching films. They will be available in both color and black and white, either individually or up to the total of 120. They will be designed and produced in ten major topics or parts consisting of twelve films each. In addition to these basic films, there will be from thirty to forty special additional topics consisting of more advanced treatments or more detailed treatments of the some material or of additional subjects. Later, it is intended to develop still further supplementary materials of various sorts based on the basic and special films. These supplementary materials will consist of film strips, shorter films, documentaries, etc. Also, later, it is intended to supply a laboratory guide to go with the course. Why this particular number of basic films and why the additional special or supplementary material? Because our goal is maximum use and maximum flexibility. A pattern consisting of units or parts which in many cases may be interchanged to suit the convenience or preference of the teacher was thought desirable. Further, it is our intention to encourage development of laboratory and field work and for this reason, the basic course is designed to allow time for such laboratory or field work.

I should not need to remind you that available capital is limited and that this is not our only limitation. A number of predetermined patterns such as the length of the school year, the class period, the film time, our need for an early completion date, and other factors must be considered. We must fit our course into as many patterns as possible, but by being admittedly somewhat procrustean, we hope to do our best and to make the most appropriate use of the medium under these limitations.

The format of the films will consist of: 1) a continuing teacher—myself—in a studio-classroom situation using models, demonstrations, living materials, and other visual aids; 2) guest lecturers and visits to other biologists' laboratories and field excursions; 3) use of cinemicrography and still photographs; and 4) animation. All this within the limits of our time and our capital. In other words, if someone provides the students, a classroom teacher, a place for them to meet, and probably a textbook, we'll provide a film teacher, a teacher's manual in ten parts with tests and a student's study guide designed to go with the films.

The content of the course will treat all the major areas of biology. The tentative titles of the ten parts, each consisting of twelve films, are: (1) Cell Biology, (2) Microbiology, (3) Multicellular Plants (structure and function), (4) Multicellular Animals (structure and function), (5) Reproduction, Growth and Development, (6) Genetics, (7) The Diversity of Plants, (8) The Diversity of Animals, (9) Ecology, (10) Life, Time and Change.

Continuing themes, to be emphasized wherever appropriate throughout the course, include the following: (the order does not indicate rank on the basis of significance—they are all important; also, please remember that at the moment, I am using the terminology—perhaps the jargon—of the professional biologist, not that of a tenth-grader).

Theme 1. *Homeostasis:* the organism as a dynamic, energy-transforming system, maintaining and increasing itself through the expenditure of energy. This means an

emphasis on general, cellular and comparative physiology greater than has been usual in introductory courses. The emphasis is to be on the verb rather than the noun, on the process rather than it static record, on the motion picture rather than the still picture.

Theme 2. *Evolution:* The continuity of organisms through time which has resulted in their present adaptive diversity.

Theme 3. *Ecology:* The organism-environment complex, particularly the broad bio-geo-chemical patterns of the circulation of matter and energy. Adaptation as a dynamic process links ecology and evolution.

Theme 4. *The Complementarity of structure and function.* This is another example of the Janus faces we meet so commonly in science, the ever-present twins of matter-energy, structure-function, organism-environment.

Theme 5. *Man's Role in Nature as a basis* from which it can be seen that conservation is one of the highest and most enlightened forms of self interest from the biological point of view.

Theme 6. *Methods:* the process of "sciencing" as a human activity with strong roots in the past, a forever "open-ended" present and tremendous potentiality for development in the future. Somehow our pride in what is known should be tempered by our need to know more. We must stimulate an interest in further work in our field by being clear as to what is known, and what still needs to be known, rather than presenting biology as a closed, completed subject surrounded on all sides by acres of terminology. A little of the fascinating (and sometimes confused) intellectual history of biological concepts should help us to do this.

Theme 7. *Behavior* as a biological phenomenon, with adaptive significance. While the present development of the common ground between the biological and behavioral sciences leaves much to be desired, it is clear that each species has evolved through its own history resulting in its own adaptive responses. This entire area needs more emphasis from biology. Only organisms behave and think; to a large extent how they behave and how they think depends on the kind of organism.

There will be in all this some new ideas for some teachers, but we trust that new ideas are not difficult just because they are new. I hold to the conviction that any topic or principle understandable by any of us can be dealt with at any level of understanding. It is not necessary to pervert knowledge in order to communicate with young students. In general, a number of the topics discussed so far by the consultants have come through the process less complicated rather than more so. You would be surprised at some of the neat little accumulations of rubbish we have already uncovered here and there, some pretty far along in the nitrogen cycle! For example, let's take the word 'osmosis'—there's a word that concealed a particularly rich accumulation of confusion, contradiction and complete absurdity. It didn't take long to discover that no one really needed it; in fact, we get along a lot better without it, and without all of its combined forms, too. The term will not be used; various physical and biological processes are much clearer if we talk only about diffusion, membranes and, of course, cells and their activities.

I have mentioned the consultants several times in passing, and so I should now outline the pattern of organization which is involved in administering the project and working out its content. The entire project is under the supervision of the AIBS Committee on Education and Professional Recruitment which appointed a Steering Committee of sixteen members and the Project Director, who chose his own staff, consisting of an assistant and three consultants (two are writers, one is involved in preparation of demonstration materials and specimens). The Steering Committee also produced a long list of possible consultants in each of the ten major areas to be covered. To date, 102 different persons have been invited to participate. Of these, 74 have accepted very active involvement in the project, some serving on more than one group of consultants, and eleven more have agreed to contribute comments and criticisms by correspondence because of their inability to attend meetings. This total of 85 acceptances out of 102 invitations is very impressive. There could be no clearer demonstration of the concern over the secondary school curriculum felt by our two joined professions —biology and teaching.

As for our timetable, we speak hopefully of having a pilot film done in late April and of starting full film production by the end of May. We expect to have the basic course, at least, done and in use by the fall term of 1960.

Our staff is complete, and all the consultant groups have met at least once. To those who fear that the content will be authoritarian or biased, I can only say that I sometimes think, as the consultants struggle with the selection of material, that anything as democratically produced as this course runs a greater risk of being a sterile hybrid than an official "pure line". But, as I've already indicated, the results are, more often than not, simplified, reasonably well reduced to essentials, with uncertain or unknown subjects described as such or left out. And if some parts are new or complex, they are so because of the material itself.

Some questions are bound to arise concerning social pressures, local prejudices and regional enclaves of ignorance. We need not interpret dogmatically, nor usurp the proper functions of philosophy, religion or social custom, but we would be invertebrate betrayers of our students if we didn't expose the facts of biology to speak for themselves. Unfortunately, whatever we do will be in some cases abused as well as used. We will try to teach biology as it is understood today, no more, but certainly no less. The long-range self-interest of the human species requires this.

I started by referring to these films as instruments, as tools, and I think of them as that—a medium of communication from organism to organism, not as ends in themselves, nor as a substitute for any other aspect of communication. The kind of education we are all aiming at needs to make use of field and laboratory experience with the objects and processes studied in biology, and to make use of films, books, magazines and all forms of printed material, *and to intergrate all this,* we still need *good teachers.* We hope our efforts will be received as they are intended.

Steering Committee—Secondary School Biological Sciences Film Series

Dr. Herbert Albrecht, Pennsylvania State University; Dr. Marston Bates, University of Michigan; Dr. John Bodel, The Hotchkiss School, Lakeville, Conn.; Miss Jean E. Cooper, Senior High School, Cheyenne, Wyoming; Dr. Harriet B. Creighton, Wellesley College; Dr. Ralph Emerson, University of California; Dr. Ralph W. Gerard, University of Michigan; Dr. Philip G. Johnson, Cornell University; Dr. Frank Lindsay, California State Department of Education; Dr. L. S. McClung, Indiana University; Dr. Dorothy Matala, Iowa State Teachers College; Dr. Richmond Mayo-Smith, The Phillips Exeter Academy; Dr. Daniel Mazia, University of California; Dr. John A. Moore, Columbia University; Dr. Albert E. Navez, Newton High School, Newton, Mass.; Dr. Oswald Tippo, Yale University.

Staff—Secondary School Biological Sciences Film Series

Director—Dr. H. Burr Roney, University of Houston, Houston, Texas; *Asst. to the Director*—Mr. Jack Steuerwald, Houston, Texas; *Writers*—Mr. William H. Amos, St. Andrews School, Middletown, Delaware; Mr. Joseph P. McMenamin, Oak Park and River Forest High School, Oak Park, Illinois; *Demonstrations and Preparations Consultant*—Mr. Robert B. Lewis, Aspen Public School, Aspen, Colorado; *Secretary*—Mrs. Jayne Szaz.

Course Content Consultants

Group I—Cell Biology

Dr. Jay Barton, St. Joseph's College, Collegeville, Indiana
Dr. Richard Goodwin, Connecticut College, New London, Connecticut
Mr. Isadore Halpern, Erasmus Hall High School, Brooklyn, New York
Dr. Addison Lee, University of Texas, Austin, Texas
Dr. Hewson Swift, University of Chicago, Chicago, Illinois
Dr. Claude A. Villee, Harvard University Medical School, Boston, Massachusetts

Group II—Microbiology

Dr. Ralph Emerson, University of California, Berkeley, California
Mr. Phillip Fordyce, Oak Park and River Forest High School, Oak Park, Illinois
Dr. L. S. McClung, Indiana University, Bloomington, Indiana
Dr. Kenneth B. Raper, University of Wisconsin, Madison, Wisconsin
Dr. J. B. Shay, Purdue University, Lafayette, Indiana
Dr. Tracy M. Sonneborn, Indiana University, Bloomington, Indiana
Dr. Richard Starr, Indiana University, Bloomington, Indiana
Dr. Vance Tartar, University of Washington, Nahcotta, Washington

Group III—Multicellular Plants

Dr. Harriet B. Creighton, Wellesley College, Wellesley, Massachusetts
Dr. Arthur W. Galston, Yale University, New Haven, Connecticut
Dr. Addison Lee, University of Texas, Austin, Texas
Dr. Richmond Mayo-Smith, Phillips Exeter Academy, Exeter, New Hampshire
Dr. Reed Rollins, Harvard University, Cambridge, Massachusetts
Dr. Kenneth Thimann, Harvard University, Cambridge, Massachusetts
Dr. Oswald Tippo, Yale University, New Haven, Connecticut
Dr. Ralph Wetmore, Harvard University, Cambridge, Massachusetts

Group IV—Multicellular Animals

Dr. Ralph W. Gerard, University of Michigan, Ann Arbor, Michigan
Dr. Adrian Hogben, George Washington University Medical School, Washington, D. C.
Dr. Arthur W. Martin, National Science Foundation, Washington, D. C.
Dr. Dorothy Matala, State Teachers College, Cedar Falls, Iowa
Dr. John A. Moore, Columbia University, New York, New York
Dr. John S. Rankin, University of Connecticut, Storrs, Connecticut
Dr. Oscar E. Schotte, Amherst College, Amherst, Massachusetts
Dr. Grover C. Stephens, University of Minnesota, Minneapolis, Minnesota

Group V—Reproduction, Growth and Development

Dr. James M. Brennan, National Microbiological Institute, Hamilton, Montana
Dr. Ralph Cleland, Indiana University, Bloomington, Indiana
Dr. Harret B. Creighton, Wellesley College, Wellesley, Massachusetts
Dr. James D. Ebert, Carnegie Institute of Washington, Baltimore, Maryland
Dr. Mac Edds, Jr., Brown University, Providence, Rhode Island
Dr. Carl E. Hopkins, University of Oregon Medical School, Portland, Oregon
Dr. Theodore L. Jahn, University of California, Los Angeles, California
Dr. Charles A. John, The H. J. Heinz Co., Bowling Green, Ohio
Dr. Albert E. Navez, Newton High School, Newton, Massachusetts
Dr. Marcus Rhoades, Indiana University, Bloomington, Indiana
Dr. Adrian Srb, Cornell University, Ithaca, New York
Dr. Carl P. Swanson, John Hopkins University, Baltimore, Maryland
Dr. John G. Torrey, University of California, Berkeley, California

Group VI—Genetics

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Miss Jean E. Cooper, Senior High School, Cheyenne, Wyoming
Dr. Harriet B. Creighton, Wellesley College, Wellesley, Massachusetts
Dr. Theodore Dobzhansky, Columbia University, New York
Dr. Benson E. Ginsburg, University of Chicago, Chicago, Illinois
Dr. Carl E. Hopkins, University of Oregon Medical School, Portland, Oregon
Dr. Marcus Rhoades, Indiana University, Bloomington, Indiana
Dr. Adrian Srb, Cornell University, Ithaca, New York
Dr. Carl P. Swanson, Johns Hopkins University, Baltimore, Maryland

Group VII—The Diversity of Plants

Dr. Ted Andrews, Kansas State Teachers College, Emporia, Kansas
Dr. Elso Barghoorn, Harvard University Herbarium, Cambridge, Massachusetts
Mr. Lorenzo Lisonbee, Phoenix Union High School and Phoenix College System, Phoenix, Arizona
Dr. George F. Papenfuss, University of California, Berkeley, California
Dr. Samuel N. Postlethwait, Purdue University, Lafayette, Indiana
Dr. Leland Shanor, Florida State University, Tallahassee, Florida
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Group VIII—The Diversity of Animals

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Dr. Ralph Buchsbaum, University of Pittsburgh, Pittsburgh, Pennsylvania
Dr. Philip G. Johnson, Cornell University, Ithaca, New York
Dr. William Z. Lidicker, Jr., University of California, Berkeley, California
Dr. Alvah Peterson, State Plant Board of Florida, Gainesville, Florida
Dr. James A. Welch, West Virginia University, Morgantown, West Virginia

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Dr. Herbert Albrecht, Pennsylvania State University, State College, Pennsylvania
Dr. Ralph Buchsbaum, University of Pittsburgh, Pittsburgh, Pennsylvania
Dr. Joel W. Hedgpeth, College of the Pacific, Marin County, California
Dr. William Z. Lidicker, Jr., University of California, Berkeley, California
Dr. Henry J. Oosting, Duke University, Durham, North Carolina
Dr. Robert W. Pennak, University of Colorado, Boulder, Colorado
Dr. Paul B. Sears, Yale University Conservation Program, New Haven, Connecticut
Dr. Claude A. Villee, Harvard University Medical School, Boston, Massachusetts
Dr. Fritz W. Went, Missouri Botanical Garden, St. Louis, Missouri

Group X—Time, Life and Change

Dr. J. Edison Adams, University of North Carolina, Chapel Hill, North Carolina
Dr. John Bodel, The Hotchkiss School, Lakeville, Connecticut
Dr. Edwin Colbert, American Museum of Natural History, New York
Dr. Theodore Dobzhansky, Columbia University, New York
Dr. Benson E. Ginsburg, University of Chicago, Chicago, Illinois
Dr. John A. Moore, Columbia University, New York
Dr. Loren C. Petry, Ithaca, New York
Dr. Bobb Shaeffer, American Museum of Natural History, New York
Dr. G. Ledyard Stebbins, University of California, Davis, California
Dr. Ruben Stirton, University of California, Berkeley, California
Dr. Edward O. Wilson, Harvard University, Cambridge, Massachusetts

Other Consultants

Dr. Donald P. Abbott, Hopkins Marine Station, Pacific Grove, California
Dr. Edward F. Adolph, School of Medicine, University of Rochester, New York
Dr. Walter Landauer, University of Connecticut, Storrs, Connecticut
Dr. Raymond C. Moore, University of Kansas, Lawrence, Kansas
Dr. Theodore T. Puck, Department of Medicine, University of Colorado, Denver, Colorado
Dr. Herbert H. Ross, Natural History Survey, Urbana, Illinois
Dr. Marcus Singer, Cornell University, Ithaca, New York
Dr. John H. Welsh, Harvard University, Cambridge, Massachusetts
Dr. William H. Weston, Harvard University, Cambridge, Massachusetts

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The Biological Sciences Curriculum Study

ARNOLD B. GROBMAN, *Director, Biological Sciences Curriculum Study*

"WE NEED to give more national attention to the quality and content of courses and curricula in science, both in high schools and colleges. We need extensive, organized, national efforts to bring together in each subject field the leading scientists and scholars with groups of high-school and college teachers, for re-examining and modernizing the content of courses in the sciences. We need to bring about the preparation of better and more modern textbooks and to find ways of making available better but less expensive laboratory equipment. Taking the country as a whole, there seems to have been a serious decline in the quality of laboratory teaching in recent years. In too many places it has become routine, overmechanized, and sterile.

This combination of requirements calling for bold and large-scale efforts to enable our teachers to teach better and to modernize and improve our curricula in science is pressing upon us now." (1)

These words, addressed to a joint meeting of Phi Beta Kappa and Sigma Xi last December by Dr. James R. Killian, special assistant to the President for Science and Technology, could well be considered the preamble to the Biological Sciences Curriculum Study.

When the AIBS became an independent organization in 1955, the first standing committee that was established was one on Education and Professional Recruitment. This action reflected the continuing concern of biological societies and the AIBS Governing Board with education in the life sciences. The charge to that Committee was a simple one: develop a vigorous program of education at all levels which would become the basic policy of the Institute. Committee membership has been drawn from persons interested in biological education in universities, liberal arts colleges, land grant universities, high schools and preparatory schools; Dr. Oswald Tippo, of Yale University, has been Chairman of the Committee from its establishment.

At the first Committee meeting in 1956 it was evident that the Committee's major interest was in the improvement of course content at all levels of instruction and in the development of means to make the teaching of biology more effective. In that year, as an initial step in its program, the Committee published a list of specific suggestions as to how academic members of professional societies could aid high school teachers and students in improving course offerings in their local communities.

A variety of significant educational projects in biology have since been initiated by the AIBS. Many were done through member societies but a number are being carried on by the AIBS itself such as the Visiting Biologists Program and the High School Film Series, both of which are described in other articles in this issue of the *Bulletin*.

The minutes of that first meeting of the AIBS Committee on Education and Professional Recruitment show that considerable time was spent discussing an extensive course content study in the biological sciences. It was visualized from the first that such a study necessarily must involve not only the content of courses but the entire teaching-learning process of students at all ages. It was realized that many presently accepted dicta concerning what biological material is presented at various educational levels might prove invalid in the light of exhaustive and penetrating investigation. The Committee felt strongly that such a course content improvement study was of great importance and it proceeded enthusiastically in developing an organizational framework for the program. Much thought had been given the project by a number of interested and competent biologists and the Committee now felt that a next step was to familiarize the biological community in general with the goals of such a study.

Plans for the study were developed deliberately and carefully in the six Committee meetings which followed during the next three years. In the meantime, reports on the progress of planning were made to biologists at every available opportunity. The status of the proposed study was outlined to society representatives on the AIBS Governing Board at annual Board meetings in 1956, and 1957, and at both Board meetings in 1958. The proposal to establish a curricular study was approved as an AIBS project at the May, 1958, meeting of the AIBS Governing Board, after having been approved in principle at the August, 1957, meeting.

Every possible occasion has been utilized to apprise biologists of AIBS plans and to elicit from them suggestions for improving the proposed study. Dr. Tippo mentioned the curriculum study as well as the filmed course in an article published in the January, 1957, issue of the *AIBS Bulletin*. A summary of the current program of the AIBS in education, including an exposition of the course content study, was written by Dr. Hiden T. Cox, Executive Director of the AIBS, for the June, 1958, *AIBS Bulletin*. Dr. Wallace O. Fenn, then President of the AIBS, reported on the status of the project at the General Sessions of the 1957 and 1958 annual AIBS-sponsored Meetings of Biological Societies. Dr. Tippo described the project at some length at the North American Wildlife Conference Meetings in St. Louis in March of last year and, in December, at the meetings of the American Association for the Advancement of Science. Dr. Fenn, again, announced at the 1958 annual meeting of the Governing Board of the National Academy of Sciences—National Research Council Division of Biology and Agriculture that the AIBS was well along with plans to embark upon this venture. Dr. Cox has devoted considerable time during the last year discussing these plans with groups of teachers, secondary school and college administrators, and other interested persons.

In addition, items of information concerning the project have appeared in a number of society publications due largely to the interest of representatives on the AIBS Governing Board. Journals of the Botanical Society of America, the Ecological Society of America, the American Bryological Society, the Association of Southeastern Biologists, the Entomological Society of America, the Society of American Foresters, the American Phytopathological Society, the American Society for Horticultural Science, the American Fisheries Society, the Society of American Bacteriologists, the American Society of Parasitologists, and the American Society of Ichthyologists and Herpetologists, among others, have carried summaries of the status of AIBS plans for the project.

At various times when this proposed curriculum study has been discussed by the Education Committee and by the Governing Board there have been present invited representatives of many organizations known to have an interest in the project such as the National Science Foundation Division of Scientific Personnel and Education, the Advisory Board on Education of the NAS-NRC, the Committee on Educational Policies of NAS-NRC Division of Biology and Agriculture, the Division of Biology and Medicine of the NSF, and the Fund for the Advancement of Education. Officials in appropriate divisions of the Office of Naval Research, the Atomic Energy Commission, the Office of Sciences of the Department of Defense, and the National Institutes of Health have been kept informed of AIBS plans, as have been certain interested persons on the National Science Board and officials of the AAAS Science Teaching Improvement Program and the Council on Basic Education.

The result of this preliminary work is an identification of the AIBS with biological sciences curriculum and course content studies in the minds of interested persons and common acceptance of the responsibility AIBS has in sponsoring these studies.

A steady flow of correspondence is being received by the AIBS from biologists requesting information, making suggestions, and offering assistance to the project. The

antecedents of this study may be traced to many, diverse sources, and the collective thinking of a great many people is incorporated into our plans.

That some knowledge of science and mathematics is indispensable to every person is self evident. The sciences have become as necessary to the educated person as the humanities. It is the responsibility of schools at every level to impart to students an understanding of the sciences which should become a part of their thinking and their philosophy. This is an absolute minimum goal that must be attained by our educational system.

In addition, at certain levels in their educational experience, those students who are motivated toward science and who have the required intellectual capacity should be shown the possibility of careers in science; the training needs to be available so that they can develop into professional scientists.

Basic science should include an understanding and an appreciation of the life sciences. The basic science taught in the schools should include biology in proper perspective with and in relationship to the other fundamental scientific disciplines. Every educated person should be able to count among his philosophical resources an understanding of evolution (2), of genetics, of energy relationships, as well as the principles of optics and mechanics and what makes a sputnik go.

This is not presently the situation. According to certain studies (3), about three out of four tenth grade pupils in the United States take biology. Twice as many students in high school take biology as take chemistry or physics. It might reasonably be expected, therefore, that general public understanding and appreciation of biology would be at a relatively high level. Contrast this, however, with the billions of dollars spent annually on fake medicines and quack doctors, with the regrettable tensions and misunderstandings between race groups, and with the conflicts and cold wars traceable to inefficient and wasteful uses of natural resources by burgeoning human populations. Biologists have not measured up to their opportunity to present to the student-citizen what he must know to be able to lead a satisfying and productive life.

A knowledge of biology is important for its practical consequences are virtually limitless. A major part of the world's economy is based upon agriculture. The health of the entire race depends upon research in medicine, dentistry, psychology and public health. New sources of food from the sea or from the culture of fresh-water algae must be exploited. Proper husbandry of natural resources is important to the survival of mankind. The placing of man into space is an exciting challenge and certainly is a biological as well as a physical problem. Of equal importance, perhaps, is a knowledge of biology as an intellectual activity for "disinterested intellectual curiosity is the life blood of real civilization." (4)

Of all the scientific disciplines, it would seem that biology would be the one a student would be most easily motivated to explore. Most observers do not find this to be the case. Much of the blame for this situation probably can be directed to the subject itself. Biology does have special problems. Its challenges are somewhat less clear than those of chemistry and physics. Its fundamental underlying principles often are obscured by the emphasis that is placed upon comparisons between groups of organisms, or upon different levels of organization, or upon terminology and classification schemes, which are too frequently presented as ends in themselves. The science is greatly fragmented and workers in different subdisciplines often have difficulty in communicating with one another. In consequence, some students do feel that biology is a diffuse, uncorrelated science which is uninteresting and, very likely, unimportant.

It is the responsibility of biologists to somehow bring themselves together and to agree upon what things in biological science should be known by an educated person and how these things can best be taught. This, then, would constitute a charge to a group investigating the curricular content in the life sciences in the United States.

After an initial grant of $143,000 was made to the AIBS by the National Science Foundation, a Biological Sciences Curriculum Study was established with the writer as Director of the Study. Late in January, headquarters for the BSCS were established in the Biology Building at the University of Colorado in Boulder.

While the grant was being negotiated, great care was taken by the Education Committee and the AIBS Executive Committee to select the best available qualified persons for service on a Steering Committee for the BSCS. Those selected represent various fields of biology, colleges and universities, high schools both public and private, and school administrators.

The members who were able to come to the first meeting, in Boulder on February 5–7, were: Dr. Walter Auffenberg, Department of Biology, University of Florida; Dr. Paul F. Brandwein, Forest Hills, New York; Dr. Elmer G. Butler, Department of Biology, Princeton University; Dr. Wallace O. Fenn, School of Medicine and Dentistry, University of Rochester; Mr. Harper Follansbee, Phillips Academy; Dr. H. Bentley Glass, Department of Biology, Johns Hopkins University; Dr. David R. Goddard, Division of Biology, University of Pennsylvania; Dr. Arnold B. Grobman, Biological Sciences Curriculum Study, AIBS; Dr. Lewis H. Kleinholz, Division of Mathematics and Natural Science, Reed College; Mr. Paul Klinge, Coordinator for School Science, Indiana University; Dr. C. Ladd Prosser, Department of Physiology, University of Illinois; Dr. Alfred S. Romer, Museum of Comparative Zoology, Harvard University; Dr. Paul B. Sears, Conservation Program, Yale University; Miss Ella Thea Smith, Cave Creek, Arizona; Dr. William C. Steere, New York Botanical Garden; Dr. H. Burr Steinbach, Department of Zoology, University of Chicago.

They were joined in their deliberations at the meeting by the following persons, some of whom remained over from an AIBS Education Committee meeting of the previous day.

Dr. Gordon Alexander, Department of Biology, University of Colorado; Dr. Donald B. Anderson, Provost, University of North Carolina; Dean Ronald Bamford, Graduate School, University of Maryland; Dr. John Bodel, The Hotchkiss School; Dr. Hiden T. Cox, American Institute of Biological Sciences; Dr. Harriet B. Creighton, Department of Botany, Wellesley College; Dr. James G. Dickson, Department of Plant Pathology, University of Wisconsin; Dr. Harvey Fisher, Department of Zoology, Southern Illinois University; Mr. Philip Fordyce, Oak Park-River Forest High School, Illinois; Dr. C. Donald Larsen, National Institutes of Health; Dr. Robert S. Leisner, American Institute of Biological Sciences; Dr. L. S. McClung, Department of Bacteriology, Indiana University; Dr. Gairdner Moment, Department of Biology, Goucher College; Dr. Quigg Newton, President, University of Colorado; Mr. Richard E. Paulson, Division of Scientific Personnel and Education, National Science Foundation; Dr. Hugo Rodeck, Natural History Museum, University of Colorado; Dr. H. Burr Roney, Biological Sciences Film Series, AIBS; Mr. Jack Steuerwald, Biological Sciences Film Series, AIBS; Dr. Oswald Tippo, Osborn Botanical Laboratory, Yale University; Dr. Newell Youngren, Department of Biology, University of Colorado.

Under the chairmanship of Dr. Bentley Glass, there were two and a half days of fairly intensive discussions with several topics being quite thoroughly debated.

It might be added, parenthetically, that a number of other curricular studies are being pursued in other fields. Mention might be made of the mathematics studies at Yale University, the University of Illinois and the University of Maryland. A series of conferences are being conducted on the basic issues in the teaching of English. The Modern Language Association has a program concerning foreign languages in the elementary schools. The curricular study that is furthest along, and probably best known to readers of the *Bulletin*, is that of the Physical Science Study Committee with headquarters at Cambridge, Massachusetts. (The PSSC has restricted its efforts to the intensive study and detailed design of a high school level course, while our program calls for a more extensive study of the life sciences curricula through an investigation of the offerings at all levels, elementary, secondary, college and professional, and a consideration of coordination among them. Another difference between the two programs is the production of textbooks by the Physics Group, whereas we now plan to promote flexibility by stopping at the preparation of recommendations and outlines and leaving the

writing of textbooks to others.) Plans are also under way to set up a study of curricular offerings in the field of chemistry. Other projects are concerned with economics, history, geology, and anthropology.

At the BSCS meeting in Boulder it was recognized that our study will generally pass through five stages: (a) information gathering, (b) analyses and evaluations, (c) tentative recommendations, (d) pilot testing, and (e) final recommendations. Concurrent with these progressive activities there should be a program designed to enlist the cooperation of biologists, educators and administrators. The actual work will be done by groups of consultants specially selected for their outstanding competence in particular areas. Some groups might be charged with the first three stages, that is, information gathering, analyses and evaluations, and tentative recommendations, while others would be responsible for the pilot testings and final recommendations.

The BSCS is most anxious to work harmoniously with educators, administrators and laymen, as well as with scientists, in evolving effective curricula in the life sciences for our time. We do not ever want the idea to gain any currency that we are working in isolation without an overwhelming primary interest in the students of America. We also affirm that, while we are specifically concerned with the biological sciences, we fully recognize that at all levels of educational attainment there is need for improvement in instruction in the humanities, social sciences and other sciences.

Several projects were organized at the Boulder meeting; these, of course, are but a sample of the investigations that will eventually be undertaken under this Study.

Course Content in the Biological Sciences

Probably the central activity will be the work of a special Committee that will attempt to answer the general question, what should a person graduating from high school know about the biological sciences? The Committee will attempt to determine what knowledge of the life sciences a citizen should have who has completed twelve years in our public schools. After having determined the general boundaries of this sphere of knowledge, a number of small sub-committees will be recruited, probably along the lines of subject-matter areas. Each sub-committee will probably include a person from the primary schools, one from the secondary schools, one from the colleges, and perhaps one or two other persons as necessary to give the sub-committee appropriate balance and resources. These sub-committees collectively will be charged with the responsibility of designing a coordinated curriculum, for the primary and secondary levels, that will satisfy the parameters outlined by the parent committee. This new biology program will then be ready for extensive testing.

In conjunction with these studies it will be necessary to investigate the proper sequential arrangement of the new biology in the high school in line with the other sciences and mathematics. It will also be an important concern to determine whether additional courses, perhaps at the twelfth grade, would be desirable for superior students, college preparatory students and other special categories of students.

Innovation in Laboratory Instruction

The BSCS group felt rather strongly that much laboratory instruction in biology is less than inspiring and that a great deal could be done to make laboratory experiences more educationally meaningful. It is planned that this Committee can be recruited early enough to begin work during the coming summer, perhaps in cooperation with a number of high school teachers and college teachers of the basic course. It is hoped that some pilot experiments utilizing some of the laboratory exercises designed by the Committee will be attempted during the Fall of 1959.

Case Histories of Successful Biology Teachers

There are a considerable number of high school biology teachers who are generally recognized in their communities as exceptionally effective teachers. The BSCS is interested in assembling case histories of a representative group of these teachers so that the histories can be analyzed, with suitable controls, in an attempt to find out whether they contain one or more common threads. It would also be of interest to investigate the amount and the quality of the formal training in the biological sciences in the background of these exceptionally successful biology teachers.

Digest of Existing Information

There is a wealth of information available that has been assembled by federal and state agencies, scientific and educational societies, and various other organizations. The BSCS will attempt to evaluate this tremendous mass of information and prepare a digest so that its various committee members and consultants will be able to work with the existing information as an available background.

Reviews for Teachers in the Life Sciences

As an aid to teachers now in service, to students preparing for teaching careers who may be unable to elect a full program in the biological sciences, and to laymen with an interest in the general area, we plan to initiate a pamphlet series. Each pamphlet would be concerned with a specific topic, would be written by an outstanding authority, and would be carefully designed for its appeal to the intended audience. As an extension of this general program, other teaching aids will be designed to generally increase the effectiveness of instruction in the biological sciences.

Liaison with Other Science Curricular Study Groups

It will be necessary for the Director to contact a number of the studies in other branches of the sciences, some of which were mentioned above, so that effective liaison can be established and some common agreement, it is hoped, be reached about the proper sequential order of science courses in the pre-college curriculum. It will be far more meaningful to school administration officials if the various sciences can present a single recommended series of curricula rather than to have several independent and uncoordinated curricula sponsored by diverse groups.

Effective liaison has already been established between the AIBS Film Project and the BSCS.

These then are the general outlines of the status of the planning of the BSCS at this time. It is not now possible to present a timetable for our project. There will be another meeting of the Steering Committee in June in Boulder when the progress of the several projects will be reviewed and others will be initiated.

On behalf of the BSCS I invite comment and advice from members of the AIBS. I invite these remarks keeping fully in mind the observation of Zeuxis, made 2500 years ago, that criticism comes easier than craftsmanship. (5) While it will be difficult for us to design courses acceptable to all concerned, we are still, nevertheless, anxious to have as much criticism as we possibly can as early as possible.

I invite each of you also to visit this office whenever you should happen to be in Boulder or vicinity. I further invite you to mention this Study to your friends and colleagues who might be interested in our program.

I can scarcely imagine a more significant activity in the intellectual interest of this nation in the broad area of the biological sciences than this Study. We have an exciting challenge in recommending what the curricular offerings in the biological sciences should be in the United States during the latter half of the twentieth century. I predict that if our efforts are successful, and I know they will be successful because of the substantial resources at our disposal, that we will have established a pattern for repeated evaluations every twenty years or so. In other words, I am convinced that within the fields of the biological sciences we have the most important educational opportunity that any group has ever had in this country. To use this opportunity wisely will require the continued interest and meaningful cooperation of the nation's biologists—and we invite your interest and cooperation.

REFERENCES

(1) Killian, James R., Jr. 1959 "Science and Public Policy," *Science*, 129 (3342): 134.

(2) In a recent survey, forty percent of the teenagers checked "No" to the statement, "Man has evolved from lower forms of animals;" another twenty-four percent checked "Don't know." Reported in: Remmers, H. H. and D. H. Rodler. 1957. *The American Teenager*. Bobbs-Merrill, Indianapolis, p. 171.

(3) Office of Education. 1956. "Offerings and Enrollment in Science and Mathematics in Public High Schools." U. S. Department of Health, Education and Welfare, Pamphlet No. 118, p. 9.

(4) Trevelyan, George Macaulay. 1942. Preface, *English Social History*.

(5) Quoted by Pliny in his *Natural History*.

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JOINT MEETINGS OF BIOLOGICAL SOCIETIES

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The Pennsylvania State University

AUGUST 30 - SEPTEMBER 3

HETZEL UNION BUILDING

LOCAL ARRANGEMENTS COMMITTEE—*Chairman:* Dr. R. E. Larson

Organizations and Representatives

AMERICAN MICROSCOPICAL SOCIETY
T. H. Cheng, Dept. of Zoology and Entomology, Pennsylvania State University

AMERICAN PHYTOPATHOLOGICAL SOCIETY
J. E. Livingston, Head, Dept. of Botany and Plant Pathology, Pennsylvania State University

AMERICAN SOCIETY FOR HORTICULTURAL SCIENCE
R. E. Larson, Head, Dept. of Horticulture, Pennsylvania State University

AMERICAN SOCIETY OF HUMAN GENETICS
C. C. Li, Graduate School of Public Health, University of Pittsburgh

AMERICAN SOCIETY OF LIMNOLOGY AND OCEANOGRAPHY
Edwin L. Cooper, Dept. of Zoology, Pennsylvania State University

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AMERICAN SOCIETY OF PLANT PHYSIOLOGISTS
A. A. Benson, Agriculture and Biological Chemistry, Pennsylvania State University

AMERICAN SOCIETY OF ZOOLOGISTS
Adam Anthony, Dept. of Zoology, Pennsylvania State University

BIOMETRIC SOCIETY (ENAR)
Carol S. Weil, Mellon Institute, 4400 5th Ave., Pittsburgh, Pennsylvania

ECOLOGICAL SOCIETY OF AMERICA
Martin W. Schein, Dept. of Poultry Husbandry, Pennsylvania State University

GENETICS SOCIETY OF AMERICA
James E. Wright, Assoc. Professor of Genetics, Pennsylvania State University

NATIONAL ASSOCIATION OF BIOLOGY TEACHERS
H. Seymour Fowler, Chairman, Science Ed., Pennsylvania State University

NATURE CONSERVANCY
Ward M. Sharp, Pennsylvania Cooperative Wildlife Research Unit, Pennsylvania State College

SOCIETY FOR INDUSTRIAL MICROBIOLOGY
Mary B. O'Hara, Applied Sciences Laboratories, Inc., State College, Pennsylvania, and Arthur Rose, 525 South Gill Street, State College, Pennsylvania

SOCIETY FOR THE STUDY OF DEVELOPMENT AND GROWTH
J. E. Livingston, Head, Dept. of Botany and Plant Pathology, Pennsylvania State University

SOCIETY OF PROTOZOOLOGISTS
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TOMATO GENETICS COOPERATIVE
B. L. Pollack, Dept. of Horticulture, Pennsylvania State University

A.I.B.S. SPONSORED MEETINGS OF BIOLOGICAL SOCIETIES

THE PENNSYLVANIA STATE UNIVERSITY

August 30 - September 3, 1959

INFORMATION ON HOUSING AND MEALS

RESIDENCE HALLS ACCOMMODATIONS — Rooms in well equipped campus residence halls may be reserved by persons attending the A.I.B.S. Conference. Accommodations are available for individual, couples, and families. Double rooms with single beds and a very small number of single rooms are available.

It is necessary to assign two people to each double room. Therefore, two persons wishing to be assigned to the same room should make arrangements with each other before applying for University housing and indicate their preference in the space provided on the housing reservation form. If possible, the reservation forms should be mailed together. If requested in advance, an extra bed may be placed in a double room if parents desire to have their child in the room with them. Otherwise, adjacent rooms will be assigned to family groups as far as possible.

The room rate is $2.50 per night per person in a double room, and $3.00 per night in a single room. Blankets, bed linen, soap, and towels are furnished. Daily maid service is provided. There are no private baths; however, student bathrooms are located on each floor. No charge is made for infants when parents supply their own crib and bedding.

Occupancy of rooms may be had from noon on Saturday, August 29, to noon on Friday, September 4. Payment for accommodations in the residence halls is made at the time of check-in.

Because of limited accommodations, everyone planning to attend the conference is urged to make housing reservations well in advance. Acknowledgement will be made for preregistration forms received before August 14. These acknowledgements should be presented upon arrival at the receiving station at the Hetzel Union Building on the University campus. Your residence hall and room number will be designated at final registration.

OTHER HOUSING ACCOMMODATIONS — The Nittany Lion Inn on The Pennsylvania State University campus is an attractive colonial inn, operated in cooperation with the Department of Hotel and Institution Administration. The University golf course across the street (Route 322) is available at a nominal charge to guests of the Inn. Accommodations include double and twin-bedded rooms, and a limited number of single rooms. The Inn has an air-conditioned dining room and coffee shop.

Other accommodations are available at the Autoport Motel, College Court Motel, Nittany Manor Motel, Penn Hi-Boy Motel, Ranch Court Motel, Hotel State College, and Taylor Motel. Campsites are available in two state parks which are approximately twenty miles from the University campus. For additional information refer to AIBS Reports column, page 33.

Reservation requests for all housing (resident halls, motels, hotels) should be made on the application on the opposite page and mailed to:

Extension Conference Center
The Pennsylvania State University
University Park, Pennsylvania

Do not send money with the preregistration. Acknowledgement of each advance registration received before August 14 will be made on a form which should be presented upon arrival at the receiving station at the Hetzel Union Building on the University campus.

FOOD SERVICE — Food service will be available in three dining areas which will provide cafeteria service utilizing a pay-as-served system. The customary University "package-plan" has been eliminated to expedite your registration. This will remove any misunderstanding or financial penalties resulting from special lunches and banquets. Persons in residence in West Halls will eat their meals in Waring Dining Hall, and those in South Halls, in Redifer Dining Hall. These facilities will offer a single entree with choice of beverage, vegetables, salad, and dessert. Charges will be $1.00 for breakfast; $1.25 for lunch; and $2.25 for dinner. Children 12 years old and under will be accommodated at a rate of $.50 for breakfast; $.65 for lunch; and $1.10 for dinner.

For those not in residence in either West or South Halls, cafeteria service with a multiple choice menu is available in the Terrace Room, Hetzel Union Building. Since the facilities of the Hetzel Union Building are limited, you can assist food service personnel in providing the best possible service by eating your meals in the dining area to which you are assigned.

BANQUETS — Special breakfasts, luncheons, and banquets are listed in the schedule on page 33. Tickets may be purchased at final registration.

PRE-REGISTRATION FORM

A.I.B.S. MEETINGS

August 30 - September 3, 1959

PRE-REGISTRATION IS ESSENTIAL TO PROPER ASSIGNMENT OF FACILITIES

REGISTRATION AND HOUSING APPLICATION

Name..... (First) (Middle) (Surname)

Home Address..... (Street)

..... (City) (State)

Professional Address .....

.....

Title.....

Institution.....

Are you a Graduate Student..... (Yes)
(Graduate Students are eligible for a reduced registration fee)

Signature of major professor.....
(Applies only to Graduate Students)

Society Membership:
(1).....

(2).....

(3).....

I plan to attend the following society banquets.....

.....

I plan to take the following field trips.....

.....

Please print or type the above information and mail to:

EXTENSION CONFERENCE CENTER
THE PENNSYLVANIA STATE UNIVERSITY
UNIVERSITY PARK, PENNSYLVANIA

Date.....

Male ☐ Female ☐

Roommate Preference..... (Name)

Couple ☐ Couple with children

Child's name	Sex	Age
.....	.....	.....
.....	.....	.....
.....	.....	.....

Expected time of arrival at State College (University Park)..... (Date & Hour)

Departure from State College (University Park) ..... (Date & Hour)

Please make reservations for me in a

University Residence Hall ☐

Hotel ☐ Motel ☐

I will not require housing ☐

Remarks.....

.....

.....

Travel Arrangements: By Automobile..... (Date & Hour)

By train at Lewistown..... (Date & Hour)

By train at Altoona..... (Date & Hour)

By plane at Black Moshannon Airport

(Allegheny Airlines) ..... (Date & Hour)

NOTE: Commercial bus service will be available from train stations and limousine service will be available from airport to State College.

Across the Editor's Desk

• **Revised Civil Service qualification requirements for professional research positions.** Instructions have been issued by Dr. B. T. Shaw, Administrator, Agricultural Research Service to all research Divisions in that Agency explaining the effect of recent modifications of qualification standards on the recruitment and placement in professional research positions of persons with Ph.D. degrees.

For some years, the qualification standards for professional positions in the Federal government have followed different patterns in both the amount of experience required and the amount of credit allowed for graduate education. The Civil Service Commission has now established a common pattern for professional positions applicable to the biological and social sciences as well as to engineering, physical sciences, and mathematics. Starting with the basic requirement of a bachelor's degree qualifying for GS-5, the new common pattern of qualifications for professional positions is as follows:

1 year of professional experience at the GS-5 level qualifies for GS-7

2 years of professional experience (with 1 year at GS-7 level) qualifies for GS-9

3 years of professional experience (with 1 year at GS-9 level) qualifies for GS-11

For grades above GS-11, there will be no increase in the *amount* of experience required, but an increasingly higher *level* of experience will be required.

The new common pattern for the crediting of graduate education as a substitution for experience for professional positions is as follows:

1 year of graduate study will qualify in full for GS-7

2 years of graduate study will qualify in full for GS-9

Completion of all requirements for the Ph.D. degree will qualify in full for GS-11. For grades GS-12 and above, graduate study may not be substituted for the 1 year of experience required at the level of difficulty comparable to the next lower grade.

(*Note*: Bachelor graduates with high scholastic attainments who do not meet the other educational or experience requirements for GS-7 may qualify for that grade if they have had a college grade average of "B" or equivalent or better or if they graduated in the upper 25 percent of their class.)

The above pattern for crediting graduate education is applicable only to those types of positions for which graduate study is an appropriate method of preparation and not to those for which actual professional work experience is a prerequisite to proper performance. This means that for the most part the revised pattern for crediting graduate education will be applicable to positions of a research or developmental nature. Appropriate examination announcements (including those for Agricultural Research Scientist, Agricultural Economist, and others pertinent to ARS activities) have now been amended to reflect these new standards.

These new standards are considered an important asset to the Agricultural Research Service, particularly from the standpoint of enabling a Ph.D. degree to qualify for GS-11 in their various types of research positions. It should be kept in mind, of course, that a Ph.D. graduate hired for GS-11 must be assigned duties and responsibilities commensurate with that grade level.

• **World List of Future International Meetings** will be published on June 1, 1959. This monthly calendar will furnish a record of all meetings drawing on three or more nations which are to be held anywhere in the world during the next three years, giving the sponsors and the addresses of organizing committees wherever possible, and with the subjects indexed for convenient use. It will supersede the *National Science Foundation's List of International and Foreign Scientific and Technical Meetings*, which ceased publication with the January, 1959 issue.

The *World List* will be available from the Superintendent of Documents, Washington 25, D. C., at a subscription price to be announced.

• **Publication of a newsletter designed to provide physicians with preliminary appraisals of new drugs as soon as possible after drugs are marketed** has just been started by Drug Therapeutic Information, Inc. The publication to be issued fortnightly is called The *Medical Letter on Drugs and Therapeutics*.

• **The 1959 Spring Semester of the University of Illinois has been designated as the "Darwin Centennial Semester"** to commemorate the 100th anniversary of Darwin's *The Origin of Species* and its impact on culture.

• **Symposium on enzymes in health and disease** will be held at the University of California Medical Center in San Francisco, April 2–4, 1959. A staff of 28 internationally recognized investigators will participate in the three day meeting.

• **The American College of Radiology to produce radiation protection motion picture for physicians.** A motion picture illustrating the medical aspects of radiation, including protective measures in diagnostic radiologic examinations, will be distributed soon to the Nation's physicians by the American College of Radiology.

• **Western Reserve University and Rand Development Corporation will sponsor a three-day international conference on "Standards on a Common Language for Machine Searching and Translation"** from September 6–12, at the Tudor Arms Hotel in Cleveland, Ohio.

This meeting will bring together about 60 of the leading information processing systems specialists and designers from all over the world. Expected to participate are specialists from Australia, Brazil, Czechoslovakia, England, France, Germany, India, Japan, Italy, Netherlands, USSR, and Yugoslavia.

• **The University of Michigan Biological Station will conduct its fifty-first consecutive eight-week session of courses and research** from June 20 to August 15 this year in the Mackinaw region of Michigan. Seven courses in botany and ten in zoology will be taught by a faculty of seventeen prominent biologists from eight separate colleges and universities.

• **The Ninth International Botanical Congress** will be held in Montreal, August 19–29, 1959, at the University of Montreal, McGill University and Sir George Williams College.

• **The American Psychiatric Association** will hold its 115th Annual Meeting at Convention Hall Auditorium in Philadelphia, Pennsylvania, Monday through Friday, April 27–May 1, this year.

• **The American Academy of Arts and Sciences announces three prizes of $1000 each to be awarded annually to the authors of** especially meritorious unpublished monographs—one each in the fields of the Humanities, Social Sciences and Physical and Biological Sciences. The final date in 1959 for receipt of manuscripts by the committee on awards is October 1. Announcement of the awards will be made in December. Full details concerning these prizes may be obtained from the Committee on Monograph Prizes, American Academy of Arts and Sciences, 280 Newton Street, Brookline Station, Boston 46, Massachusetts.

• **The Soil Conservation Society of America will hold its 14th annual convention** August 26–29, 1959, in Rapid City, South Dakota. Emphasis will be placed on soil and water conservation problems and practices of the nation and adjoining Canada.

• **Gordon Research Conferences** on Cancer, Cell Structure and Metabolism, Toxicology and Safety Evaluations, will be held the 31st of August through the 4th of September at Colby Junior College in New London, New Hampshire.

• **The second seminar on biological problems in water pollution** is being held at the Robert A. Taft Sanitary Engineering Center at Cincinnati, Ohio, April 20–24, 1959.

• **The Kaiser Foundation Research Institute is sponsoring a symposium** on

the comparative biochemistry of photoeffector pigments, both plant and animal, to be held September 14–17, 1959, at Asilomar on the Monterey Peninsula, California. For further information, contact Dr. Mary Belle Allen, Kaiser Foundation Research Institute, S. 14th And Cutting Blvd., Richmond, California.

• **Courses in medical mycology to be offered again July 1–25, 1959, at Duke University School of Medicine and Duke Hospital.** The course is open to clinicians, pathologists, bacteriologists, technicians and others who have an interest in the medical phases of mycology. Write Dr. Norman F. Conant, Duke Hospital, Durham, North Carolina.

• **Roscoe B. Jackson Memorial Laboratory, celebrating its 30th anniversary,** will hold a Symposium on June 15, 16 and 17, 1959, at Bar Harbor, Maine, on *Some Problems of Normal and Abnormal Differentiation and Development.* Application should be made not later than April 15th to Dr. Nathan Kaliss, Symposium Chairman, Roscoe B. Jackson Memorial Laboratory, Bar Harbor, Maine.

• **Announcement of Darbaker Prize in physiology for 1959.** The Botanical Society of America will accept nominations for an award the winner of which will be announced at the annual meeting of the Society at Montreal in 1959. Under the terms of the bequest, the award is to be made for meritorious work in the study of the algae. Members as well as nonmembers of the Botanical Society are eligible for the award. The Committee will base its judgment primarily on the papers published by the nominee during the last two full calendar years previous to the closing date for nominations. At present, the award will be limited to residents of North America. Only papers published in English will be considered. Nominations for the 1959 award accompanied by a statement of the merits of the case and by reprints of the publications supporting the candidacy should be sent to the Chairman of the Committee in order to be received by June 1, 1959.

• **An Ecology of Algae Symposium will be held** by the Pymatuning Laboratory of Field Biology, University of Pittsburgh, on June 18 and 19, 1959. The papers presented will be published, together with the discussions, by the laboratory.

• **The Eighteenth Growth Symposium,** sponsored by the Society for the Study of Development and Growth, will be held at the University of Wisconsin, Madison, Wisconsin, on June 11–13, 1959. Attendance at the Symposium is open to members and non-members of the Society.

• **Closing date for receipt of basic research proposals in the life sciences announced.** The Division of Biological and Medical Sciences of the National Science Foundation announces that the next closing date for receipt of basic research proposals in the life sciences is May 15, 1959. Proposals received prior to that date will be reviewed at the summer meetings of the Foundations's advisory panel, and disposition will be made approximately four months following the closing date. Proposals received after the May 15, 1959 closing date will be reviewed following the fall closing date of September 15, 1959.

• **Institute established to coordinate expanding research program in population genetics—Purdue University.** The major objective of the Institute will be to investigate the effects of various types of gene action in response to selection under various mating systems and varying environmental conditions.

In addition to theoretical studies, problems will be investigated experimentally with laboratory organisms such as *Drosophila, Tribolium* and mice.

Facilities for the Institute in Purdue's new Life Science Building will include three specially designed climate controlled chambers. The facilities of the statistical and computing laboratory, including a digital computer, will be used for expanding theoretical or mathematical approach to problems of population genetics.

• **Field course in botany planned from June 19–August 25** at University of Washington in Seattle. The 1959 Field course will be offered for 12 credits to students who have had a college course in elementary plant taxonomy.

A more detailed announcement for prospective field trip students may be obtained by writing Dr. A. R. Kruckeberg, Department of Botany, University of Washington, Seattle 5.

• **The world-famed Botanic Garden at Bogor, Indonesia, offers interesting positions to botanists in the old world tropics.** The world-famed Botanic Garden at Bogor (formerly Buitenzorg), Indonesia, is interested in offering its facilities to trained scientists, willing to work either at Bogor or one of its several subsidiary gardens including the mountain garden at Tjibodas. The Foundation for Nature Research, under which the Botanic Garden operates, also needs cooperators for the numerous explorations to the various islands of Indonesia that are regularly carried out under its auspices. Opportunities are available both in the various branches of botany as well as in horticulture.

Inquiries may be sent (airmail) directly to Prof. Kusnoto Setyodiwiryo, Director, Foundation for Nature Research, Botanic Garden, Bogor, Indonesia.

• **Meeting held at the College of Fisheries, University of Washington, Seattle, Washington, February 17, 18 and 19, 1959,** discussed the biological and economic aspects of fisheries conservation. Participating in the meetings were fisheries biologists, fisheries management personnel from government agencies, industry (including fishermen and vessel owners), and economists. The papers that were presented at the conference and the discussions that followed will be published in the near future and will be available to those who are interested.

• **The Fourth International Mushroom Congress,** will be held in Copenhagen from July 18 to July 26, 1959.

• **$58,300 fund has been awarded to Station KETC-TV and Saint Louis University** to cover the academic cost for the production of a film series entitled *Principles of Genetics.* The series of 45 films to be financed by the McGraw-Hill Company of New York are scheduled to be telecast over KETC-TV initially in the Spring semester of 1960. and will serve as the basis for a regular college credit course in genetics.

• **The Atomic Energy Commission announces a grant of $80,000 to the University of California** for the purchase of equipment for use in industrial radioisotope training courses. The grant is the first to be made under a recently announced program of assistance to colleges and universities for education and training in radioisotope principles and technology.

• **A new $3,600 Fellowship in Advance Oral Pathology is being offered** for the 1959–60 academic year by New York University's College of Dentistry. The fellowship is sponsored by the American Cancer Society. According to Dean Earl O. Butcher of the College, it is intended "to provide a practicing dentist or a graduate student of the physical sciences an opportunity to make individual investigation in cancer and allied fields."

• **Carleton College received a gift of $1,500,000 from Olin Foundation Incorporated** to build and equip a new building for biology and physics. The largest single gift in the history of the College was accepted on behalf of the College by Carleton's president, Dr. Laurence M. Gould, Dr. Thurlo B. Thomas, Chairman of the Department of Biology, and Dr. Robert A. Reitz, Chairman of the Department of Physics.

• **The American Ornithologists' Union** will hold its next annual meeting August 25–30, 1959, at the Saskatchewan Museum of Natural History, Regina.

• **Prominent scientists from the U.S. and abroad have been invited to discuss their recent work at the 10th Annual Biological Symposium** at the University of Michigan, July 6–8.

Topic this year, in the program sponsored by the U-M Division of Biological Sciences, is "Cell Structure and Function."

• **The 2nd International Conference on Medical Electronics** will be held at the new UNESCO Building in Paris starting Wednesday, June 24, at 2 p.m.

• **Interscience Publishers** has announced the publication this month of the first

issues of two new international journals, the *Journal of Medicinal and Pharmaceutical Chemistry* and the *Journal of Biochemical and Microbiological Technology and Engineering*.

• **13th annual meeting of the Southeastern Game and Fish Commissioners** will be held in Baltimore, Maryland, October 26, 27, and 28, 1959.

• **American pharmaceutical companies aid International Physiological Congress in Buenos Aires.** The American Pharmaceutical Industry has responded generously to a request for financial support of a triennial International Physiological Congress, this one (the XXIst) to be held in Buenos Aires on August 9–15, 1959.

• **Canada host to World Congress of Botany, August 19–29.** The largest scientific gathering ever to be held in Canada will be the Ninth International Botanical Congress, August 19–29, 1959, when some 6000 delegates will meet at Montreal. Some 2,000 of these botanists from 72 countries will take part in an extensive series of field trips to all parts of Canada, from coast to coast—and even to the sub-Arctic.

• **The first National Conference on the Legal Environment of Medical Science** will be held May 27–28 on the University of Chicago campus. To bring order into the hodge-podge of laws and regulations now governing medical research the Society for Medical Research, in conjunction with the University of Chicago, has called the first National Conference on the Legal Environment of Medical Science.

• **72nd annual meeting of the American Association of Anatomists** is scheduled for Seattle, Washington, April 1–3.

• **17th annual meeting of the Electron Microscope Society of America** will be held September 9–12, 1959, on the campus of Ohio State University, Columbus, Ohio.

• **University salaries up.** The median salary of full-time teachers in Canadian universities and colleges rose 8.2 per cent to $7,136 between 1957–58, and 1958–59, and 23.6 per cent between 1956–57 and 1958–59, according to a Dominion Bureau of Statistics advance release, based on returns from 55 institutions covering basic annual salary rates at November 1, 1958. The 4,803 persons included for 1958–59 comprised 134 deans, 1,194 professors, 1,100 associate professors, 1,433 assistant professors, 82 ungraded professors, and 860 lecturers and instructors.

By field, excluding deans, the highest median ($7,711) was for the biological sciences, including medicine, followed by the physical sciences ($7,129), the social sciences ($6,885), and the humanities ($6,495). This order was unchanged from the two previous years.

By region, median salaries in 1958–59 for all ranks combined were highest in Western Canada ($7,558), followed by Ontario ($7,420), Quebec ($6,756) and the Atlantic Provinces ($5,923). In the two previous years Ontario ranked first. By rank, medians for Ontario were in almost all cases slightly higher than in the West.

• **Twelfth Symposium in Biology of the Brookhaven National Laboratory** will be held June 1–3, 1959. The annual summer conference is sponsored by the Biology Department of Brookhaven National Laboratory.

• **Harvard Summer School,** in cooperation with the Massachusetts Audubon Society, offers courses in Field Biology for teachers and advanced students from June 29–August 12, 1959.

• **The Fourth Annual Conference on Quantitative Studies of Growth and Genetic Processes in Mammalian Cells** will be conducted by the Department of Biophysics of the University of Colorado, August 31–September 3, 1959.

• **Attention has been drawn to the mistake** that appeared in the January, 1959 issue of the *AIBS Bulletin* on page 37 regarding the 7th International Anatomical Congress. Dr. L. B. Flexner (designate to the 7th International Anatomical Congress) should have read—Dr. Don W. Fawcett is the Executive Secretary Designate of the Congress and will be the Executive Secretary when so elected by the Congress. Also, on page 40 of the Bulletin, Dr. H. Stanley Bennett is now President of the Anatomists Association and Dr. Edward W. Dempsey, president-elect.

• **C. R. Gutermuth,** Vice President of the Wildlife Management Institute, has received the coveted Distinguished Service Award of the National Association of Soil Conservation Districts. NASCO President **Nolen J. Fuqua** cited Gutermuth for his long years of successful effort in promoting management of the Nation's soil, water, wildlife land related sources, before 900 persons attending the annual banquet in Houston, Texas.

• **Carl O. Dunbar,** Director of the Peabody Museum of Natural History at Yale University and internationally-known scientist, will retire this June. A leading geologist, Dunbar's most noted contribution to science was his study of fusulines; small fossils that are of immense importance in helping oil geologists to date the rocks brought up in their well cores. His three-volume publication has helped the petroleum industry locate oil producing levels.

• **Bruce W. Halstead,** formerly of the School of Tropical and Preventive Medicine, College of Medical Evangelists, Loma Linda, California, has recently been appointed Director of the World Life Research Institute presently under construction on a 60-acre tract in Reche Canyon, Colton, California.

• **Lester R. Dragstedt,** Professor of Surgery of the University of Chicago, has been re-elected President of the National Society for Medical Research.

• **Ileen E. Stewart,** former editor of the *AIBS Bulletin*, has accepted a position with the Office of Scientific Information Services, National Science Foundation, effective February 1, 1959.

• **C. Bruce Lee** has been appointed Chief of the Microbiology Section, Research Division of the Ordnance-Tank Automotive Command of Center Line, Michigan. During the past seven years he has served as Unit Chief on the Materials Laboratory at the Detroit Arsenal where he recently acted as consultant to the Douglas Aircraft Corporation of Santa Monica, California, the Chrysler Corporation Missiles Division and North American Aviation Company on matters relative to the microbiological testing of missile components.

• **Vero C. Wynne-Edwards,** Regius Professor of Natural History, Marischal College, University of Aberdeen, is on leave during the second semester of 1958–59 in order to serve as Visiting Professor in the Tom Wallace Chair of Conservation, Department of Biology, University of Louisville.

• **Ayere Yusa,** recent Ph.D. in protozoology from the University of Illinois, arrived in England this past January to spend a year with the Wheatstone Laboratory of Physics, University of London, King's College. He is there at the invitation of **J. T. Randall,** F.R.S., head of the department, and has joined a biophysics group actively carrying out researches on the ultrastructure and physiology of certain ciliated and flagellated protozoa.

• **Martin Lindauer** of the University of Munich has been appointed Prather Lecturer in Biology for 1958–59 at Harvard University.

• **Leon Jacobs** has been promoted to the position of Chief of the Laboratory of Parasitic Diseases, National Institute of Allergy and Infectious Diseases of the National Institutes of Health.

• **Robert Breach** has been appointed Vice-President in Charge of Production at Consultants Bureau, Inc., New York City, scientific translation-publishers. A graduate of New York University, with a bachelor's degree in physics, Mr. Breach was formerly

with Bell Aircraft as a Processing Engineer; R. R. Donnelly as Composing Room Estimator; and with Otis Elevator Corp. as a Standards Engineer.

• **J. H. Stoeckeler,** Senior Soil Scientist with the Lake States Forest Experiment Station, University Farm, St. Paul, Minn., has been granted a Senior Postdoctoral National Science Foundation Fellowship for one year of study in ecological and hydrological aspects of the drainage of forested swamps in Europe. Finland, Sweden and Germany are on the itinerary in this study period.

• **Leland C. Wyman** of Jamaica Plain, Mass., noted authority of southwest Indian cultures and Oriental art, and Professor of Biology at the Boston University College of Liberal Arts, has been selected as the University Lecturer for the current academic year, according to a joint announcement by President **Harold C. Case,** and **Prof. Camillio P. Merlino** of Newton, Mass., Chairman of the University Lecturer Committee.

• **Edward Diamon,** Associate General Counsel of the U.S. Atomic Energy Commission, has been appointed to membership on an International Atomic Energy Agency panel of experts who will study and make recommendations regarding the legal liability to the public of those who engage in the construction, supply and operation of nuclear reactors.

• **Peyton Rous,** Member Emeritus of the Rockefeller Institute, has been honored by selection as one of the 1958 recipients of the Albert Lasker Awards presented by the American Public Health Association.

• **Emil Witschi,** Professor of Zoology at the State University of Iowa, has been invited by the Minister of National Education of France to serve as Visiting Professor at the University of Paris. He intends to present lectures on the *Biology of Reproduction* during the spring term, April 1 to June 30.

• **Russel L. Steere** has assumed leadership of the new Agricultural Research Service Pioneering Research Laboratory for Plant Virology at Plant Industry Station, Beltsville, Maryland. He was formerly Research Biologist, Virus Laboratory, University of California, at Berkeley.

• **Bengt G. Ranby** has been appointed as the Director of the Empire State Paper Research Institute (ESPRI) and as Professor of Pulp and Paper Technology at the State University College of Forestry at Syracuse University (Syracuse, N.Y.), effective April 1, 1959.

• **Francis H. C. Crick,** an eminent authority on large molecules which make up living cells, will be Visiting Professor of Chemistry at Harvard during the spring term

• **Samuel J. Ajl** has been appointed Program Director for Metabolic Biology, National Science Foundation. He comes to the Foundation from Walter Reed Army Institute of Research where he was Chief of the Microbiological Chemistry Section and Assistant Chief of the Department of Bacteriology.

• **Dr. John Wurdack,** Associate Curator of the New York Botanical Garden, accompanied by Lincoln Adderly of the Gardening Department, will collect flora of the rainy season for botanical study in Venezuela during April-August. This expedition is being made by the New York Botanical Garden in cooperation with the Servicio Botanico of the Venezuelan Government.

• **Francis C. Harwood** joined the A.I.B.S. March 1, 1959, as Director of Publications. He was formerly associated with Waverly Press, Inc., for 16 years where he held the positions of Secretary, Business Manager, and Salesman *extraordinaire*.

Mr. Harwood, who brings to the AIBS a wealth of experience in the publications field, envisions an expanding publications department that will be able to handle the ever increasing number of A.I.B.S. publications.

Mr. Harwood, known as "Skip" to his many associates, attended the Johns Hopkins University and studied law at the University of Maryland. He is a fancier of antique automobiles and resides with his wife and two sons in Riderwood, Maryland, a Baltimore suburb.

• **W. E. Castle,** Honorary Vice-President of the American Genetics Association, reached his ninety-first birthday last fall and is still active in mammalian genetics, particularly horse and pony genetics.

• **Clifford Grobstein** has been chosen to receive the Albert Brachet Prize of the Belgian Royal Academy. He is the first American among the eight scientists who have won the award during its 24-year history.

• **George P. Fulton** of Lexington, Mass., Chairman of the Department of Biology at Boston University's College of Liberal Arts, has been named to the first Shields Warren Professorship at Boston University.

The chair was established a year ago on the occasion of a 60th birthday celebration in honor of Dr. Shields Warren of West Newton, Mass., noted pathologist and Chairman of the Executive Committee of the Boston University Board of Trustees.

• **Arnold B. Grobman,** Director of the Florida State Museum of the University of Florida, has taken leave of absence to serve as Director of the Biological Sciences Curriculum Study. Headquarters of this newly organized AIBS study are located at the University of Colorado, Boulder.

Recent Deaths Among Biologists:

Charles L. Parmenter, Philadelphia, Pa., Emeritus Professor of Zoology, University of Pennsylvania; 76, December 31, 1958.

Wilhelm Ludwig, Leipzig, Germany, member of Biometric Society and zoologist at the University of Heidelberg; January 23, 1959.

Richard Armacost, Professor of Biological Sciences, Purdue University, Lafayette, Indiana; 44, February 26, 1959.

Jesse P. Greenstein, nationally known biochemist, Chief of the Laboratory of Biochemistry, NCI; February 12, 1959.

From the Societies

• **A number of biological societies are planning field trips** and tours in conjunction with the AIBS meetings at The Pennsylvania State University, August 30 through September 3. Certain trips are scheduled one, two, or three days in advance (or during) the regular meetings as shown below:

• **Ecological Society of America**

1. STONE VALLEY (Co-sponsored with the American Society of Zoologists and the American Society of Limnology and Oceanography). One day.

An excursion to the university forest in Stone Valley, Huntingdon County, Pennsylvania, is planned for Sunday, August 30, 1959. The trip will actually consist of two separate tours.

Dr. Edwin L. Cooper will guide one group along parts of Shaver Creek and Stone Creek. Limnologists will find many points of interest along these streams. The aquatic environments in Stone Valley are predominantly small and infertile mountain streams which gradually change to meandering turbid valley streams. The fish populations will be demonstrated by various types of electrofishing gear. Collecting of fish and other aquatic animals will be permitted on a limited basis.

Professor Henry H. Chisman will lead the other group on an inspection trip of the Stone Valley Forest. Stages of the Virginia pine sere, a man-made swamp, and several wildlife habitat management areas will be examined and discussed. Collections may be made on this tour.

The Pennsylvania State University Forestry Camp will be used as headquarters for both groups. Travel to the camp from State College will be by bus, leaving the forestry parking lot (on campus) at 8:30 A.M.; travel in the forest will be by truck. Lunch will be served at the camp.

The cost of either of these tours will be approximately $2.00 per person, payable at the time of registration; this fee will pay for transportation and lunch.

Those interested in either tour should contact (no later than August 1, 1959): Professor H. H. Chisman, School of Forestry, The Pennsylvania State University, University Park, Pennsylvania.

2. "BARRENS"—STRIP MINES (Co-sponsored with the American Society of Zoologists). One day.

An all-day field trip is scheduled for Thursday, September 3, 1959. Two areas of broad ecological interest will be covered: the diversified and unique Centre County "Barrens" and the strip mine area between the towns of Philipsburg and Clearfield, Pennsylvania.

The morning foray will cover the barrens where the group will examine the general plant association with reference to the topographical, climatic, edaphic and biotic aspects. The group will visit sites where rare or unusual plants are growing. Wildlife habitats will be observed and special emphasis will be placed on bird and mammal populations, and the results of habitat management for forest game. The results of a seven year study on the effects of chemical brush control upon game food and cover will be observed.

After lunch the group will proceed to the strip mine area where many of the abandoned mines are being reforested. Members will be able to judge the success of replanting. The mines contain many imprints and casts of plants of Pennsylvanian age. Arrangements will be made for those wishing to collect specimens.

The total cost of the trip, including lunch and transportation, will be approximately $1.00; participants are encouraged to bring canteens if possible. Those interested in participating should contact (no later than August 1, 1959): Dr. Edward D. Bellis, Department of Zoology, The Pennsylvania State University, University Park, Pennsylvania.

3. BEHAVIOR RESEARCH (Co-sponsored by American Society of Zoologists). Half day.

A tour of the Animal Behavior research facilities on the Pennsylvania State University campus and surrounding area will be led by Dr. E. B. Hale from 9:00 A.M. through noon, Monday, August 31, 1959. No costs are involved, and arrangements can be made during the course of registration.

4. BEAR MEADOWS. Half day.

A field trip to Bear Meadows is planned for Friday, September 4, 1959, 9:00 A.M. through noon. Bear Meadows is an intermontane bog, located in the ridge and valley section of central Pennsylvania, about 15 miles southeast of State College at an elevation of 1800 feet above sea level.

Apart from its inportance as a bog, it will be of interest to ecologists because twice during the present century the water level has risen (due to beaver activities), thereby stopping the advance of the forest into the "meadow". Palynologists will be interested in this bog because of its proximity to the southern glacial border. Ecological and palynological studies of the bog, now in progress, will be discussed. Unfortunately, since Bear Meadow is a state monument, no collecting will be allowed.

No costs are involved for this trip; transportation will be furnished. Those interested should contact (by August 1, 1959): Dr. Anton J. Kovar, Department of Botany, The Pennsylvania State University, University Park, Pennsylvania.

5. LIMNOLOGY TRIPS. One day.

In addition to the above trips, two field trips are being offered by the American Society of Limnology and Oceanography on Thursday, September 3, 1959.

a. One trip will include a short tour of Spring Creek watershed immediately adjacent to the campus. This stream is an example of a limestone stream with numerous springs of hard water mixing with surface run-off from a very fertile cultivated valley. Different types of electrofishing gear will be demonstrated and collecting for aquatic invertebrates will be permitted.

b. Another trip will be made to Black Moshannon Lake, about 20 miles north of the campus. This lake was formed by a dam on a bog stream in conjunction with a large recreational area developed by the Pennsylvania Department of Forests and Waters. The fish population will be demonstrated by seining and trap netting. Collecting of aquatic invertebrates will be permitted.

Persons wishing to make either of these trips should notify Dr. Edwin L. Cooper, Department of Zoology, The Pennsylvania State University, University Park, Pennsylvania, by August 1, 1959. Transportation will be furnished, and meals will be available locally.

• Society for Industrial Microbiology

Monday afternoon, August 31—Tour of the mushroom research facilities of The Pennsylvania State University with a lecture by Dr. Leon R. Kneebone.

Tuesday afternoon, September 1—Field trip to the Pennsylvania Fish Commission's Benner Spring Fish Research Station on Spring Creek. This is the headquarters for fish management and research in Pennsylvania. The trip will include a tour of the facilities and an opportunity to learn of fish cultural projects, such as treatment of fungus diseases of fish eggs, selective breeding of trout, and development of new and better methods for rearing, feeding, and care of trout, as well as fish management research.

Thursday afternoon, September 3—Tour of the chemical research facility at Curtiss-Wright Corporation, Quehanna, Pennsylvania, where research is being done on food irradiation, "Curon"——Curtiss-Wright's foam plastic, coal chemistry, and fuels. This trip is limited to 35 persons.

Non-members may attend these SIM-sponsored trips.

Advance reservations may be made by writing to: Miss Mary B. O'Hara, Applied Science Laboratories, Inc., 140 North Barnard Street, State College, Pennsylvania.

There will be a charge for transportation for each of these trips.

• American Society for Horticultural Science

August 27, 1959

7:45 a.m.—Leave University Park.
9:30 a.m.—Coffee stop—Carlisle, Pa.
10:45 to 12:15—Tour of C. H. Musselman Co., Biglerville, Pa. (Largest processor of apple products in the world. Also processes cherries, raspberries, peaches, blueberries, and tomatoes. Owns and operates thousands of acres of orchards.)
12:15 to 1:15—Lunch Musselman's cafeteria.
1:15 to 3:15—Tour Gettysburg National Park. (The most famous battlefield in the war between the states. A guide will accompany each bus. A view will also be afforded of President Eisenhower's farm home.)
3:15—Drive to Smoketown, Pa.
5:00 to 5:45—Tour Kauffman's Amish fruit farm.
5:45 to 6:15—Visit a general Amish family farm. (No cameras.)
7:00 to 8:30—Pennsylvania Dutch dinner at Hotel Brunswick, Lancaster, Pa. (seven sweets—seven sours)
9:30—Overnight lodging at West Chester, Pa.

August 28, 1959

8:00 a.m.—Drive through King Ranch.
8:15 to 9:00—Tour of W. W. Phillips mushroom houses. (18 air conditioned mushroom houses for year around production.)
9:30 to 10:20—Burt Smith's greenhouse chrysanthemum production. (Engineer turned florist. One of finest organized production programs in the country.)
10:30 to 11:30—Tour J. H. Thompson's Sons greenhouses. (One of the largest producers of cut roses in Pennsylvania. 3½ acres under glass—120,000 rose plants.)
11:45 to 1:00—Lunch at Conard-Pyle Co. picnic grounds.
1:00 to 3:00—Tour Conrad-Pyle Co., growers of world famous "Star" roses. (Tour in buses of 350 acres devoted to rose plant culture. Largest producer of miniature roses in the U.S. See propagation operation, storages, packing sheds, salesrooms, postal system and self-service retail outlet.)
3:30 to 5:30—Guided tour of Longwood Gardens, one of the nations most important horticultural show places. (Established by the late Pierre S. du Pont. Magnificent water gardens, greenhouses, arboretum, and fountain displays.)
6:30 to 7:30—Dinner Longwood Gardens ballroom.

7:30 to 8:30—Informal visit of points of special interest at Longwood Gardens.
8:30 to 9:30—View the spectacular night display of Longwood's fountains.
10:00—Lodging at West Chester, Pa.

August 29, 1959

8:00 a.m.— Drive through Valley Forge National Park.
10:00 to 11:00—Visit William H. Yerkes, Jr. and Sons farm at Buckingham, Pa. (350 acres of sweet corn, packing and grading, stericooler, delivery system.)
11:15 to 12:30—Tour trial grounds of W. Atlee Burpee Co. at Doylestown, Pa. (Vegetable and flower seed production, variety trials, seed laboratories, etc.)
12:30 to 1:30—Lunch—Courtesy of W. Atlee Burpee Co.
1:30—Leave for University Park.
3:30—Coffee break.
6:30—Arrive University Park.
Approximate cost—$30.00.
Plan now to participate in this tour.

• **The Genetics Society of America** Two tours to view genetics research in progress will be conducted. One will visit the Benner Spring Fish Research Station of the Pennsylvania Fish Commission to see work in trout genetics. The other will visit various programs of research on the Penn State campus, including evolutionary studies in *Solanum*, genetics of forage species, and poultry genetics.

• **The Mycological Society of America** will not meet with the AIBS in 1959 because of the International Botanical Congress Meeting in Montreal in August. The Society Council will meet in Montreal during the Congress. Time and place will be announced in the spring issue of M.S.A. Newsletter.

The Society for Industrial Microbiology program committee will be glad to consider general papers on deterioration, food preservation, or mycology. These contributions may be sent directly to the SIM program chairman: Dr. Paul F. Klens, State Teachers College, Lock Haven, Pennsylvania.

Non-members may submit papers for the SIM program but the subject should have some relation to the microbiological field.

Letters to the Editor

To the Editor:

Reunions of university and college biology departments ought to become a regular feature of our annual AIBS meetings. For many years the University of Chicago botanists have held a luncheon, and occasionally other similar groups meet. Alumni and faculty reunions are held at other national meetings, for example, those of foresters.

University reunions are one of the easiest and best methods of maintaining personal contact between the institutions and their graduates. Besides seeing again our professors and classmates, we get to meet the new teachers and the recent graduates. No formal program is necessary. A professor can report on the state of the university and particularly about developments in our own department. Individually, we all can tell briefly what we are doing and give news items. Address lists of alumni can be brought up-to-date, too.

The best time and place for these reunions at Pennsylvania State University is on Sunday night, August 30, in classrooms. Any faculty member planning to be present can reserve a classroom for his department by writing to: Mr. Wayne Bechdel, Extension Conference Center, The Pennsylvania State University, University Park, Pennsylvania. A list of the reunions scheduled promptly can be published in the General Program, and all notices can be posted on the bulletin board near the registration desk.

So, department heads or alternates who are coming to Penn State, please make your reservation now.

ELBERT L. LITTLE, JR.,
Member, AIBS Governing Board,
U. S. Forest Service, Washington, D. C.

A.I.B.S. Reports

• **AIBS Meetings 1959**—Most biological societies meeting with the AIBS at The Pennsylvania State University are planning some kind of breakfast, luncheon, tea, and/or banquet. Those already scheduled appear below:

August 30

Luncheon:
American Microscopical Society (Executive Committee)
Dinner:
American Society for Horticultural Science (Executive Committee)

August 31

Luncheon:
Society for the Study of Development and Growth
Tea:
National Association of Biology Teachers
Dinner:
Society of Protozoologists (Executive Committee)
Banquet:
American Phytopathological Society
American Society of Plant Physiologists

September 1

Breakfast:
American Phytopathological Society (Extension-Industry)
Luncheon:
American Society for Horticultural Science (Extension)
Ecological Society (Behaviorists)
Society of Protozoologists
Banquet:
American Society for Horticultural Science
American Society of Human Genetics
Ecological Society
Society for Industrial Microbiology

September 2

Luncheon:
American Society of Parasitologists
Society for Industrial Microbiology
Tea:
American Society of Parasitologists
Banquet:
American Society of Zoologists
Genetic Society of America

For persons desiring campsites of the AIBS annual meetings, accommodations are available at two Pennsylvania State Parks, Greenwood Furnace and Black Moshannon State Parks. Both parks are about 20 miles from State College and have swimming, recreational and picnic facilities. Camping facilities are available, with a charge of $1 per night or $3 per week, for tents or trailers. No advance reservations are necessary.

FAMILY ACTIVITIES

August 31
1:30-4:30 p.m.—Bus trip to Whipples Dam (Scenic tour, picnic area, swimming, etc.)

September 1
1:30-4:30 p.m.—Bus trip to Penns Cave

September 2
1:30-4:30 p.m.—Bus trip to Indian Caves and Coleraine State Park

August 31 to September 2
1:30-4:30 p.m.—Guided walking tours of Penn State campus

HOTELS AND MOTELS

State College area hotels and motels are as follows: NITTANY LION INN (all rooms air-cooled; dining room and coffee shop), university campus; HOTEL STATE COLLEGE (some rooms have TV; restaurant), adjacent to university campus; AUTOPORT MOTEL (TV in all rooms; restaurant), Route 322 east; NITTANY MANOR MOTEL (TV and air conditioning in all rooms; free continental breakfasts), Route 322 west; RANCH COURT MOTEL (TV in some rooms), Route 322 east; TAYLOR MOTEL (TV and radios in some rooms), Route 322 west; COLLEGE COURT MOTEL (TV and air conditioning in all rooms), Route 322 west; PENN HI-BOY MOTEL (all rooms air conditioned; some with TV; restaurant), Route 322 east.

The average rate is $5 to $8 for singles; $7 to $10 for doubles; and $8 to $12 for twin-bedded rooms.

• **Schedule of committee meetings**

March 23—Advisory Committee on Cancer to AEC, Brookhaven Labs, New York

March 25–26—Summer Institute Meeting for AEC, University of California, Los Angeles

April 12—Advisory Committee on Physiology to ONR, Atlantic City, New Jersey

April 12—Advisory Committee on Biochemistry to ONR, Atlantic City, New Jersey

April 13—NIH-AEC-AIBS Aging Conference Chairmen Meeting, Atlantic City, New Jersey

April 10–11—Advisory Committee on Aging to AEC, Washington, D. C.

April 29–30—Advisory Committee on Education and Training to AEC, New York City

May 8–9—Advisory Committee on Microbiology to ONR, St. Louis, Missouri

May 13–14—Symposium on Natural and Mammalian Hibernation, Dedham, Massachusetts

• **Attention–Employers of Biologists:**

The February, 1959, AIBS Placement Service Book is presently available. The publication contains complete resumes (124) of highly specialized biologists. Price per copy $1.00.

A Placement Service Register will be conducted during the AIBS 10th Annual Meetings of Biological Societies (August 30–Sept. 3, 1959) at the Pennsylvania State University, University Park, Pennsylvania. An extensive system of posted information and interview scheduling is operated by a competent staff. The most fruitful way to use the Placement Service is to be present in person during the annual meetings. However, if you do not expect to attend the meetings, and if you are seeking assistance in placement, you may register by mail.

At the present time, registrations are being accepted for the printed June Placement Service Book (deadline May 15th): These registrations will be included in the Placement Service open records, for the benefit of employers in attendance during the Annual Meetings of Biological Societies. For complete details, please write to: AIBS Placement Service, 2000 P Street, N.W., Washington 6, D. C.

PLAN AHEAD

REGISTER NOW
for
AIBS MEETINGS

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Biology Library

Bibliography on the Effects of Ionizing Radiation on Plants. 1896–1955. by ARNOLD H. SPARROW, JOHN P. BINNINGTON AND VIRGINIA POND. 1958. Biological Department, Brookhaven National Laboratory, Upton, New York. Available from Office of Technical Services, Department of Commerce, Washington 25, D. C. $2.25.

This comprehensive bibliography includes references to pertinent articles published in about 600 different journals, and covers the literature pertaining to all kinds of effects of radiation on plants, from algae to angiosperms. Also included is a list of conferences, congresses and symposia dealing with radiation biology. A complete subject index greatly facilitates the use of the bibliography.

The field of radiation biology has expanded so fast during recent decades that even specialists in this field cannot possibly keep abreast of recent developments. This bibliography is indispensable for both specialists and general botanists interested in the effects of ionizing radiation on plants. *Karl Sax, Professor of Forestry, University of Florida.*

Basic Clinical Parasitology. DAVID L. BELDING, M.D. 1958. Appleton-Century-Crofts, Inc., New York. 469 pp. illus.

Here is a parasitology text written for medical men by an author who is himself a medical man, rather than one for parasitologists by a parasitologist. Those who like and have used the larger work in clinical parasitology by the same author will also welcome this shorter version. It should fill a real need, to use Dr. Belding's own words, for a text suited to the "medical student and busy physician," as well as to laboratory technicians and many biologists.

Despite its relatively small size, the book covers all the important aspects of practical parasitology, and even gives rather extensive attention to some organisms, such as *Toxoplasma*, now much in the medical eye but often given scant space in older texts. On the other hand, many commensals, though very common, receive rather short shrift. *Endamoeba coli*, for example, gets but a single paragraph of fine print. However, much use is made of tables, and a surprising amount of information, about non-pathogens as well as pathogens, is packed into them.

As would be expected in a manual of this sort, literature lists are rather short and tend to include only rather recent references. The parasitologist will note the omission of most of the old classic works in the field.

The book is well illustrated, though chiefly with diagrams showing life-cycles, routes of infection, and the like, and drawings to show typical morphology. Probably space limitations prevented the inclusion of figures showing pathology and host reaction to invasion.

Minor criticisms should not hide the many virtues of the book. It is likely to be useful to many people, not alone those in the intended audience. The publishers have succeeded in producing an attractive and usable volume. *Reginald D. Manwell, Syracuse University.*

Textbook of Dendrology. WILLIAM M. HARLOW and ELLWOOD S. HARRAR. 1958. Fourth Edition, 561 pp.

The fourth edition of an excellent text which appeared first in 1927. This edition retains the essential material which has made this book a standard for dendrology courses since its appearance.

The introduction is brief but concise and rather well arranged. It provides the reader with the necessary terminology and descriptive information so necessary for identification.

The text is amply illustrated with excellent photographs, distribution maps, and drawings. In particular, the photographs are very well done and substitute well for the actual material.

Although the format and sequence of chapters is essentially unchanged, much of the material has been revised to include up-to-date information particularly as concerns spelling of scientific names, numbers of plant groups, and range maps.

No key is included in the book because, as the authors indicate, ". . . this book is not comprehensive for any one portion of the country. . . ." Characteristics of families and genera are included both in tabular form and in paragraphs. Both forms of presentation are adequate for the span of territory covered.

The authors, contributors, and editors should be commended for continuing to improve an already excellent text. *Robert S. Leisner, American Institute of Biological Sciences.*

Exchange of Genetic Material: Mechanisms and Consequences. Cold Spring Harbor Symposia on Quantitative Biology. 1959. Biological Laboratory, Cold Spring Harbor, New York. 23: 433 XVI, illus. $8.00.

To quote M. Demerec in the foreword, "The problem of genetic recombination was broadly interpreted by the organizers of this Symposium to include processes involved in the synthesis of genetic materials, processes of recombination within gene loci and between closely linked loci, classical, crossing over in Drosophila, consequences of recombination within populations and the effect of recombination on gene stability."

Thirty-five papers are presented here under seven topical headings such as "Recombination of Genetic Material" and "Recombination Within Populations." The recorded discussions included after

most of the papers add to their documentary interest. Two plates showing twenty-four informal snapshots of some of the participants have been placed at the front of this volume.

Those interested in quantitative biology need little comment on the worthy contribution made by this and the preceding twenty-two volumes published by the Long Island Biological Association. *J. P. McMenamin, Oak Park-River Forest High School, Oak Park, Illinois.*

Perspectives in Marine Biology. Edited by A. A. BUZZATI-TRAVERSO. 1958. University of California Press, Berkeley and Los Angeles. 621 pp. $10.00.

This volume consists of 40 papers presented by "consultants" during a ten-day symposium at the Scripps Institution of Oceanography. The objective of the symposium was to solicit advice on the most promising approaches for pushing forward the frontiers of marine biology, to appraise recent progress, and to create a climate favorable for cross-fertilization of ideas between disciplines and countries. The result was several excellent review papers followed by considerable discussion of such controversial subjects as the relative merits of experimental vs field observations, study of taxonomy and life cycles vs functional physiology, and work at sea vs land-based laboratories.

Part I has 13 papers on Ecology, including Parameters of the Marine Environment, K. M. Rae; Inadequacy of Experiment in Marine Biology, A. C. Redfield; Problems in Development of Marine Biology, L. Zenkevitch; Benthic Fauna, P. Drach; Marine Synecology, W. Wieser; Efficiency of Ecological Field Methods, R. Riedl; Parallel Level-Bottom Communities, G. Thorson; Larval Ecology, D. P. Wilson; Future of Underwater Television, H. Barnes; Reef-Building Corals, C. M. Yonge; Plankton Communities, V. and L. Tonolli; Seasonal Changes of Plankton, B. G. Bogorov; Toward Prediction in the Sea, A. C. Hardy.

Part II deals with Physiology and Biochemistry, the principal contributions being on Biochemical Problems in Marine Biology, E. Baldwin; Homostatic Mechanisms, T. H. Bulloch; Regulatory Mechanisms, E. S. Guzman Barron; Energy Transmission, A. Szent-Györgyi; Biological Clocks, C. S. Pittendrigh; Periodicities in Organisms, A. F. Brown, Jr.; Biochemical Perspectives, S. K. Kon; Primary Production, W. R. A. Rodhe; Succession in Phytoplankton, R. Margalef; Inorganic Micronutrients, D. I. Arnon; Growth Factors, L. Provasoli; Marine Microorganisms, W. L. Belser.

Part III on Animal Behavior is treated by W. H. Thorpe (Ethology), T. H. Waterman (Plankton Navigation), A. D. Hasler (Fish Migration), and D. Miyadi (Social Interference among Fishes).

Part IV is concerned with the place of Genetics and Evolution in marine biology with special reference to Shellfish, V. L. Loosanoff; Marine Invertebrates, D. L. Ray; Benthic Microfauna, W. Wieser; Pearl Oysters, Y. Matsui; Microorganisms, A. Novick; Marine Algae, R. A. Lewin; Sessile Organisms, C. Barigozzi; Speciation, A. J. Kohn; Sex Problems, G. Montalenti; General Biology, P. Drach; Coelenterata, C. M. Yonge. In the concluding chapter A. A. Buzzati-Traverso attempts to delineate the subject matter of marine biology. He lists several problems which appear to be ripe for research.

Each paper is complete with references to the key literature and is followed by pertinent remarks recorded during the discussion period. The review articles are generally excellent, being both authoritative and provocative, but bold imaginative projections into the future are to be found mostly between the lines. *Claude E. Zobell, University of California at La Jolla.*

Time, Life and Man: the Fossil Record. R. A. STIRTON. 1959. John Wiley and Sons, New York. 558 pp., illus. $9.00.

The author aimed to produce an introductory paleontology text with a helpful, over-all perspective for more advanced students. He claims that most of the text was written for the interest of general readers with the hope of catching the attention of students with little background in biology or the earth sciences. In this reviewer's opinion, he has done well in achieving his goals supported by a diversity of useful and interesting illustrations.

The objectives and general principles prevailing throughout are presented clearly in the first five chapters. Of the total thirty-three chapters, seventeen are devoted to different periodic divisions, nine to significant groups of organisms. A brief, well-organized history of paleontology closes with the optimistic observation that most paleontologists "are no longer shackled by intolerant philosophies and beliefs in their efforts to give society the greatest benefits to be derived from their studies."

The material in the necessary treatment of classification is exceptionally well arranged and described for students. By oversight, or intention, nothing is said of the protochordates' geological record.

The twelve-page bibliography, subdivided according to the more basic chapters, will be of special interest to advanced students. A list of citations to bibliographies is limited to one page, probably sufficient for this introductory text. There is a twenty-two page general index.

In laying this book aside, the reviewer recalls several items of personal interest: that the Radiolarians received so little treatment; that the time of angiosperm origin is still not exactly known; that the oldest known angiosperm is still a monocot rather than a dicot; and finally, that not one, but three, fossil records of Archaeopteryx exist today.

Professor Stirton's new book should prove to be an aid as a vocational inspiration as well as a text for an introductory course. *J. P. McMenamin, Oak Park, River Forest High School, Oak Park, Illinois.*

Coral Island: Portrait of an Atoll. MARSTON BATES and DONALD P. ABBOTT. 1959. Charles Scribner's Sons, New York. 254 pp., illus. $4.95.

Biologists who read this book will look back upon it as a pleasurable, worthwhile investment of time. Probably it will be appreciated best by reading it leisurely, a few chapters at one time. The narrative covers a several-month ecological study of an atoll in the Caroline Islands north of New Guinea. Admittedly, the members of the scientific expedition were limited in obtaining their "whole ecological picture" in such a short time but not because of well-laid plans or a lack of enthusiasm.

This reviewer appreciated the useful reference structure of the foreword but must admit forgetting to make use of the frontal listing of illustrations, which probably out of necessity could not be arranged in narrative sequence. The numerous photographs are an excellent support to the text and should give the reader a "you-were-there" feeling. One finds himself turning back to the illustrations to get another look, for example, at Fagolier, "the paramount chief" of the island, or of Toroman, the official food divider, as if wanting to know them still better.

The retention of the first person by both authors, even though dividing the narrative between them, makes for more interest than might be expected. The authors are to be commended for their easy style and scholarly treatment.

It is possible that they have made a tremendous contribution toward presenting a more truthful mental image of the modern scientist for today's teen-ager. If the Purdue survey revealing the teen-ager's concept of our contemporary scientist is at all accurate, there is much need for a change of this image. If reading-bait is necessary for these young people, the title and attractive paper jacket should prove effective. The reader who will appreciate this work the most will undoubtedly be the ecologically minded biologist who has had somewhat similar field experiences. *J. P. McMenamin, Oak Park, River Forest High School, Oak Park, Illinois.*

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The AIBS is in the process of expanding its Russian Translations Program extensively. Funds to subsidize translation and publication of important Russian literature in biology have been obtained from the National Science Foundation, as part of a larger program to encourage the exchange of scientific information between the two countries. The following monographs have been scheduled for publication:

Origins of Angiospermous Plants. *By A. L. Takhtajan.*
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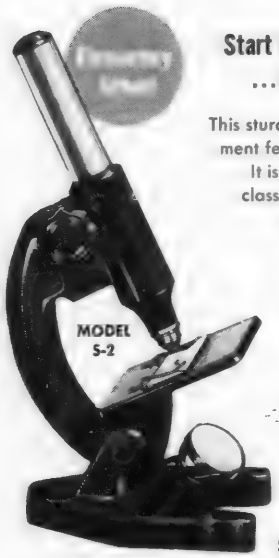

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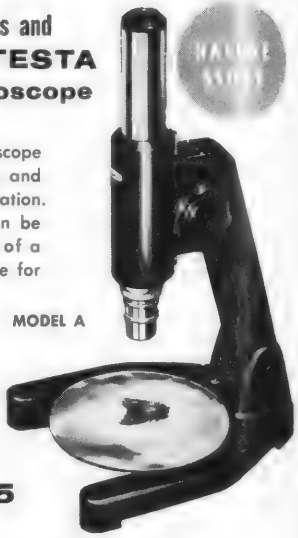

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AIBS Visiting Lecturers Program

The Visiting Lecturers Program continues to be one of the most successful projects ever undertaken by the AIBS. Reports from both institutions and participating speakers have indicated that the program is being well received. Further evidence supporting the success is that there was a 50 per cent increase in the participating speakers and nearly a 100 per cent increase in the number of speaking engagements over the 1957–1958 academic year. An even further increase is anticipated for the 1959–1960 year.

It is planned, with financial assistance from the National Science Foundation and Atomic Energy Commission, to continue the program essentially the same as in 1958–1959. However, the list of speakers will be increased by about twenty to allow more schools to participate and to cover more broadly the field of biology. A brochure is being planned which will contain not only the list of available speakers but a short biography of each plus topics which they are qualified to present.

Further publicity is to be given the program by providing press releases on speaking engagements to the home town newspapers of the speakers, newspapers of the towns in which the institutions are located, and the newspapers of the institutions.

The AIBS continues to operate the MEND Program with financial assistance from the Atomic Energy Commission. This program was initiated in February, 1959, and involves only schools of medicine. The AEC provides speakers from its installations throughout the U.S. Topics are limited to those concerned with atomic radiation injuries and the treatment of same. To date, the program gives evidence of becoming quite successful.

The AIBS has a proposal before the N.S.F. for support of a High School Visiting Biologists Program. Such a program would operate essentially the same as the already successful college program. The proposal was prompted by many requests from high schools and the feeling of the AIBS Committee on Education and Professional Recruitment that something should be done to improve the liaison between distinguished biologists and secondary school students.

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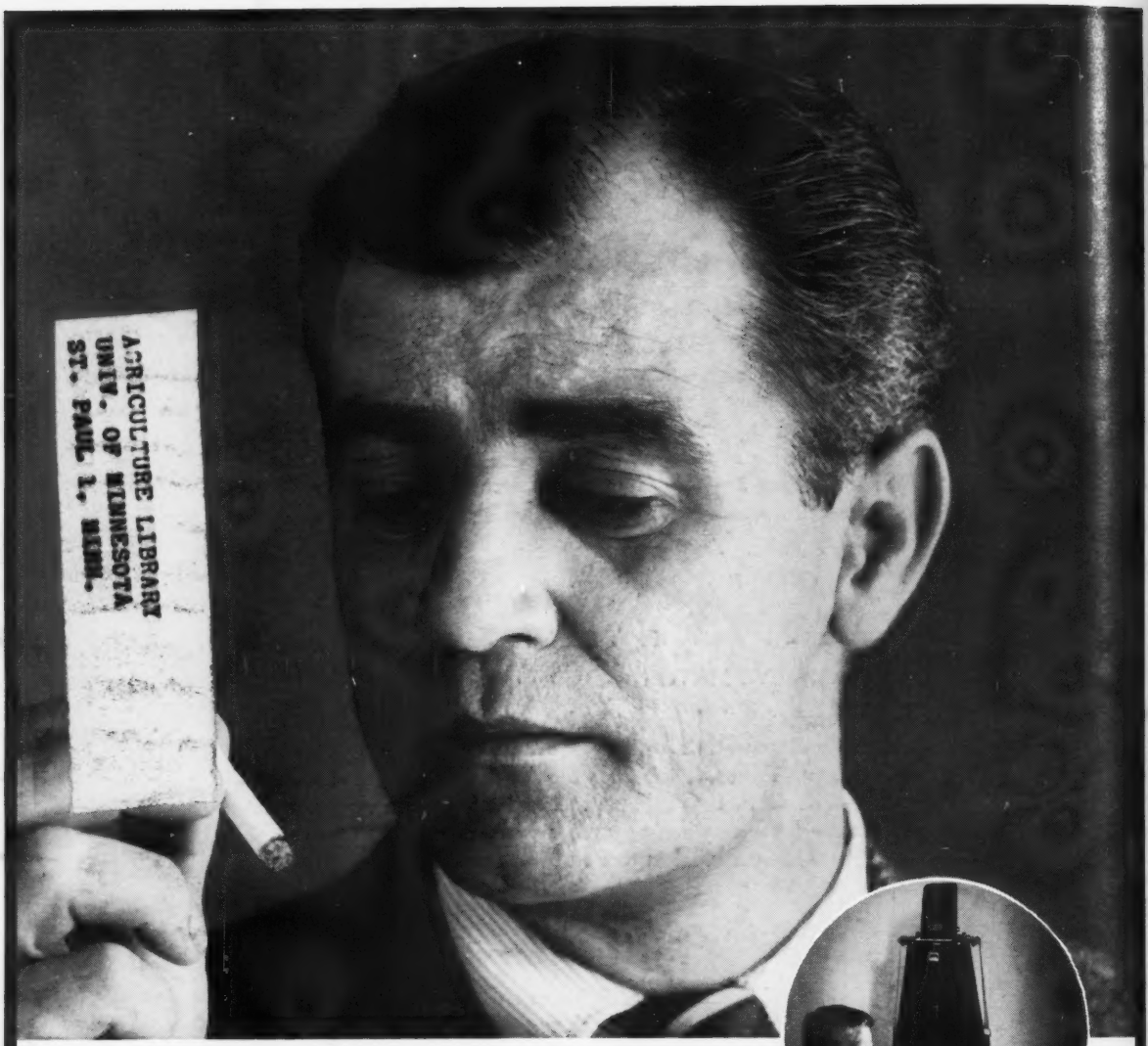

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